Hampshire Water Transfer and Water Recycling Project

Environmental Statement – Appendix 13.2 Landscape and visual impact assessment methodology

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1.1 Introduction

1.1.1 This appendix sets out in detail, the proposed approach and methodology for undertaking the Landscape and Visual Impact Assessment (LVIA) and the design of mitigation. A summary is provided within section 13.5 of the Environmental Statement (ES) Chapter 13 Landscape and visual, Volume I (Document reference 6.1, DCO Volume 6).

1.2 Assessment methodology

1.2.1 Paragraph 4.9.2 of the National Policy Statement for water resources infrastructure (NPSWRI) [1] states that "*the applicant should undertake an assessment of any likely significant landscape and visual impacts and describe these in the Environmental Statement, including cumulative impacts*".

1.2.2 ES Chapter 5 EIA approach and methodology, Volume I (Document reference 6.1, DCO Volume 6), sets out the standard Environmental Impact Assessment (EIA) methodology and significance matrix for the assessment of effects. The methodology for the LVIA has been developed on this basis, supported by reference to the best practice guidance set out in section 13.2 of ES Chapter 13 Landscape and visual, Volume I (Document reference 6.1, DCO Volume 6).

1.2.3 The methodology for the LVIA was originally set out in the EIA Scoping Report (refer to ES Appendix 5.1 EIA Scoping Report, Volume II (Document reference 6.2, DCO Volume 6)). It has been developed to set out how potential effects on the South Downs National Park (SDNP) and its setting has been assessed, responding to consultation with the South Downs National Park Authority (SDNPA) through Heritage and Landscape EIA working group meetings, feedback following the Summer 2024 Consultation and correspondence summarised in section 13.3 of ES Chapter 13 Landscape and visual, Volume I (Document reference 6.1, DCO Volume 6).

Assessment of landscape effects

Landscape designations

1.2.4 The LVIA describes the impacts of the construction, operation and decommissioning of the Hampshire Water Transfer and Water Recycling Project (the Proposed Development) which may affect the purposes of designation and the resulting effects in narrative terms. Landscape designations have also informed the value attached to the landscape of the Landscape Character Areas (LCA) and Local Landscape Character Areas (LLCA), which form the basis of the assessment of landscape effects. These considerations have been assessed separately to avoid double-counting effects.

1.2.5 Point 5(12) of the Landscape Institute's Notes and Clarifications on Aspects of GLVIA3 states that when assessing effects on designated landscapes and special landscape qualities the designation should "*be treated as a landscape receptor,*

and the assessor should report on how the special qualities (i.e. the components of natural beauty) and/or purposes of designation (if they relate to additional or different factors other than natural beauty) of a designated landscape would be affected."

1.2.6 The likely effects of the Proposed Development on the landscape character of the SDNP and the Chichester Harbour National Landscape and the setting of these designated areas have been assessed with reference to the methodology set out below. These effects are summarised in section 13.8 of ES Chapter 13 Landscape and visual, Volume I (Document reference 6.1, DCO Volume 6).

1.2.7 The LVIA has made a separate assessment of the likely effects on the purposes and special qualities of the SDNP and Chichester Harbour National Landscape. In the absence of specific guidance for England, the approach has been informed by the NatureScot Special Landscape Qualities - Guidance on assessing effects [2]. This guidance has been updated since Summer 2024 Consultation and the assessment in this ES has been reviewed to align with the current approach and adapted to address the context of the Proposed Development. The guidance promotes a four-stage approach:

1. Step 1 – Review and describe the proposal
2. Step 2 – Identify the Special Qualities that may be affected by the proposal
3. Step 3 – Assessment of effects on Special Qualities and design objectives
4. Step 4 – Summary of likely significant effects on Special Qualities

1.2.8 This guidance recognises that the high sensitivity of the designated landscape resource is inherent, irrespective of numbers of receptors. This accords with the approach to assessment of sensitivity in GLVIA3 [3] where nationally designated landscapes typically have high value and are highly susceptible to changes in landscape. Detailed assessments have been carried out for the SDNP designation using the checklist in Annex 1 of the NatureScot guidance. The principles and process set out in this document are relevant to the assessment of Special Qualities in any jurisdiction, although the terminology sometimes differs. References to aspects which are specific to Scotland, for example National Scenic Areas and Wild Land Areas, have been removed or amended to make them relevant to the planning and landscape context of the Proposed Development.

1.2.9 As noted in LI TGN 01/24, the geographical extent of the setting of nationally designated landscapes are not defined in policy or on maps. The setting is not a designation (or a receptor) in its own right and would vary with the nature of the development proposed. For these reasons, the setting does not have a fixed or definitive boundary. It can be influenced by a range of factors, such as where there is intervisibility, where the character is complementary or where there are cultural and functional connections between the designated area and the wider landscape. Therefore, the assessment refers to which and to what extent Southern Water Services Limited (the Applicant) considers the landscape character areas which form the basis of the assessment contribute to the setting of the designated area.

Landscape baseline

1.2.10 Landscape is defined by the European Landscape Convention as "*an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors*" [4].

1.2.11 Natural England's "*An Approach to Landscape Character Assessment*" [5] provides some useful context to the European Landscape Convention. It sets out the following five principles which apply to Landscape Character Assessment:

1. Landscape is everywhere and all landscape has character.
2. Landscape occurs at all scales and the process of Landscape Character Assessment can be undertaken at any scale.
3. The process of Landscape Character Assessment should involve an understanding of how the landscape is perceived and experienced by people.
4. A Landscape Character Assessment can provide a landscape evidence base to inform a range of decisions and applications.
5. A Landscape Character Assessment can provide an integrating spatial framework- a multitude of variables come together to give us our distinctive landscapes.

1.2.12 Landscape receptors are defined in GLVIA3 [3] as "*aspects of the landscape resource that have the potential to be affected by a proposal*" [3]. Landscape receptors have been identified via a review of published Landscape Character Assessments, maps and aerial photography, relevant planning policy and fieldwork surveys. A baseline description has then provided for each of the identified landscape receptors.

1.2.13 Existing landscape features that could be subject to change have been described in their own right with reference to the Arboricultural Impact Assessment (AIA) and hedgerow surveys (provided in Appendix 13.5 Arboricultural Impact Assessment, Volume II (Document reference 6.2, DCO Volume 6)), in accordance with point 5(2) of LI TGN 01/24.

1.2.14 Landscape character is defined by GLVIA3 [3] as "*a distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse*." Landscape Character Assessment is defined within the glossary of GLVIA3 as the "*process of identifying and describing variation in* the *character of the landscape, and using this information to assist in managing change in the landscape. It seeks to identify and explain the unique combination of elements and features that make landscapes distinctive*." [3]

1.2.15 Point 5(1) of LI TGN 01/24 states that "*it is not necessary to assess effects on every landscape character type or area identified by assessments at different levels for any development – the best scale of assessment for the project should be selected*" and that "*where existing assessments are too large or small scale for the nature of the development, supplementary assessment at the appropriate scale may be required and should draw from the assessment(s) available*."

1.2.16 Published Landscape Character Assessments at the national, regional and local level have been reviewed to identify Landscape Character Types (LCT) and LCA. Paragraph 5.13 of GLVIA3 [3] states that "*existing assessments must be reviewed critically as their quality may vary, some may be dated and some may not be suited*

to the task in hand" and that "before deciding to rely on information from an existing assessment a judgement should be made as to the degree to which it will be useful in informing the LVIA process."

1.2.17 The key characteristics of published Landscape Character Assessments are set out in ES Appendix 13.3 Landscape baseline and effects, Volume II (Document reference 6.2, DCO Volume 6) to provide a clear audit trail back to the original studies. This information has then been critically reviewed to inform the LLCA defined by the Applicant's competent experts, as described in more detail below. Natural England's 'An approach to Landscape Character Assessment' [5] notes the use and purpose of key characteristics, stating:

> *"Key characteristics are those combinations of elements which help give an area its distinctive sense of place. If these characteristics change, or are lost, there will be significant consequences for the current character of the landscape. Key characteristics are particularly important in the development of planning and management policies. They are important for monitoring change and can provide a useful reference point against which landscape change can be assessed. They can be used as indicators to inform thinking about whether and how the landscape is changing and whether, or not, particular policies – for example – are effective and having the desired effect on landscape character."*

1.2.18 The scale of the assessments at the district level varies, with some authorities publishing studies with very small LCAs and others with areas closer to the scale published at the county level. Therefore, these are provided for information in ES Appendix 13.3 Landscape baseline and effects, Volume II (Document reference 6.2, DCO Volume 6), but landscape effects at this scale have not been assessed.

1.2.19 A review of the existing landscape baseline has been undertaken and has defined 43 LLCA, which provide a more consistent scale against which the likely effects of the Proposed Development can be assessed. This has allowed an assessment at scales from national to local, to draw distinctions between localised and wider ranging effects.

Tranquillity

1.2.20 Tranquillity is a perceptual aspect of landscape which can also contribute to its value. GLVIA3 [3] defines tranquillity as "*a state of calm and quietude associated with peace, considered to be a significant asset of landscape*".

1.2.1 Tranquillity has been assessed with reference to published studies and fieldwork. ES Figure 13.9 Tranquillity baseline, Volume III (Document reference 6.3, DCO Volume 6), illustrates the relative tranquillity across the study area, as mapped by CPRE: The Countryside Charity, which has published a tranquillity map of England [6]. These composite maps take account of a range of positive factors, as set out in Table 1-1, and negative factors, as set out in Table 1-2 which influence relative tranquillity. The weight given to these factors in calculating the relative tranquillity of different areas is provided. The map is based on a spectrum of more or less tranquil areas, such that the scores illustrated are relative and do not identify absolute tranquillity.

Table 1-1 CPRE, The Countryside Charity positive factors which influence relative tranquillity

Positive factors	Weight
Openness of the landscape	24%
Perceived naturalness of the landscape	30%
Rivers in the landscape	21%
Areas of low noise	20%
Visibility of the sea	6%
Positive scores as a percentage of the overall scores	44%

Table 1-2 CPRE, The Countryside Charity negative factors which influence relative tranquillity

Negative factors	Weight
Prescence of other people	60%
Visibility of roads	12%
General signs of overt human impact	10%
Visibility of urban development	8%
Road, train and urban area noise	7%
Night-time light pollution	3%
Aircraft noise	1.5%
Military training noise	Less than 1%
Negative scores as a percentage of the overall scores	56%

1.2.2 Reference has also been made to the SDNPA tranquillity map, which combines its own data with that of CPRE. This provides a finer level of detail in the northern part of the study area and is reproduced in ES Figure 13.9 Tranquillity baseline, Volume III (Document reference 6.3, DCO Volume 6).

1.2.3 This information has informed the value attached to the landscape described in ES Appendix 13.3 Landscape baseline and effects, Volume II (Document reference 6.2, DCO Volume 6). It has been supplemented with more detailed notes captured during fieldwork, using the same terminology as the factors set out in Table 13-6 and Table 13-7 of ES Chapter 13 Landscape and visual, Volume I (Document reference 6.1, DCO Volume 6).

Night time baseline

1.2.4 The night time baseline is described with reference to England's Light Pollution and Dark Skies map [7] published by CPRE, The Countryside Charity; the applicable section is reproduced on ES Figure 13.10 Night-time baseline, Volume III (Document reference 6.3, DCO Volume 6). These maps are based on data gathered by a weather satellite. The data is split into nine categories (see Table 1-3) to distinguish between different light levels and the maps are divided into pixels,

400m x 400m, to show the amount of light shining up into the night sky from that area measured in nanowatts.

Table 1-3 England's light pollution and dark skies map - categories brightness

Categories	Brightness values in nanowatts/cm2/steradian (nw/cm2/sr)
Colour band 1 (darkest)	Less than 0.25
Colour band 2	0.25 – 0.5
Colour band 3	0.5 - 1
Colour band 4	1 - 2
Colour band 5	2 - 4
Colour band 6	4 - 8
Colour band 7	8 - 16
Colour band 8	16 - 32
Colour band 9	More than 32

1.2.5 Reference has also been made to the Institute of Lighting Professionals (ILP) Guidance Note 1 for the reduction of obtrusive light [8]. This guidance defines three types of light pollution:

1. Skyglow
2. Glare
3. Light intrusion

1.2.6 Table 2 of the guidance, reproduced in Table 1-4, establishes criteria for environmental zones. A measured lighting survey is not considered proportionate to the likely effects and therefore these criteria have been applied to each LLCA to help describe the relative darkness of different areas in the baseline and how these might change as a consequence of the Proposed Development.

Table 1-4 Institute of Lighting Professionals (ILP) environmental zones

Zone	Surrounding	Lighting environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones etc.
E2	Rural	Low district brightness (SQM ~15 to 20)	Sparsely inhabited rural areas, village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Well inhabited rural and urban settlements, small town centres of suburban locations
E4	Urban	High district brightness	Town/City centres with high levels of night time activity

1.2.7 The SDNP Dark Skies Technical Advice Note (TAN) sets out the SDNPAs approach to lighting design and the protection and enhancement of dark skies. Full

detail is also provided within the South Downs Lightscape Management Plan [9], which reproduces the ILP environmental zones in Table 13-12. The text supporting this table explains that "*the SDNPA is assumed to be mostly an E1 grade, with occasional E2 and E3 (e.g., Petersfield). E0 is not attainable for the SDNP as it implies banning lights which is not possible or lawful for a National Park to enforce.*"

Sensitivity of landscape receptors

1.2.8 Paragraph 5.39 of GLVIA3 [3] states that "*landscape receptors need to be assessed firstly in terms of their sensitivity, combining judgements of their susceptibility to the type of change or development proposed and the value attached to the landscape*".

1.2.9 Judging landscape sensitivity is thus a two-part process of:

1. Value attached to the landscape – relates to the existing landscape and is determined at the baseline stage in line with paragraph 5.19 of GLVIA3 [3], which states that "*as part of the baseline description the value of the potentially affected landscape should be established*"; and
2. Susceptibility to change – which is considered in relation to the Proposed Development.

Value attached to the landscape

1.2.10 Landscape Institute Technical Guidance Note (TGN) 02/21: Assessing landscape value outside national designations [10] defines landscape value as "*the relative value or importance attached to different landscapes by society on account of their landscape qualities*".

1.2.11 As set out in paragraph 4.9.11 of NPSWRI [1], "*great weight should be given to conservation and enhancement of landscape and scenic beauty in nationally designated landscapes. National Parks, the Broads and Areas of Outstanding Natural Beauty have the highest status of protection in relation to landscape and scenic beauty. Each of these designated areas has specific statutory purposes which help ensure their continued protection and which the Secretary of State has a statutory duty to have regard to in decisions. Nationally designated landscapes will therefore be attributed with very high value*."

1.2.12 For assessing landscape value outside national designations, Landscape Institute TGN 02/21 [10] is the primary source of guidance. This guidance recommends that indicators of value should be reviewed on a case-by-case basis, taking into account what they contribute (positively or negatively) to a specific landscape and that once evidence for each factor has been collated and assessed, an overall judgement should be made by considering the overall 'weight of evidence'.

1.2.13 The approach to assessing the value attached to the landscape follows a four-stage process:

1. Stage 1: identify if the landscape is covered by any landscape designations.
2. Stage 2: consider each of the factors listed in Table 1-5 which have been developed with reference to Table 1 of TGN 02/21 [10] and are pertinent and most important to understanding its value.

3. Stage 3: make an assessment the value attached to the landscape and assign value based on a five-point scale, clearly articulating the reasons for these judgements.
4. Stage 4: assess whether there is sufficient evidence through designation or the value attached to the landscape for the receptor to be considered valued landscape in the context of National Planning Policy Framework (NPPF) paragraph 187(a) [11].

Table 1-5 Determining the value attached to the landscape

Stage 1 – Landscape designations	Stage 2 - Define landscape value factors with reference to TGN 02/21 [10]	Stage 3 – Assess the value attached to the landscape	
		Criteria	Description
Landscape with statutory status or national policy protection: National Park, Area of Outstanding Natural Beauty, or World Heritage Sites Local landscape designation, such as Special Landscape Area or Area of Great Landscape Value, supported by policy and a detailed evidence base. No relevant designations	Natural heritage - Landscape with clear evidence of ecological, geological, geomorphological or physiographic interest which contribute positively to the landscape. Cultural heritage - Landscape with clear evidence of archaeological, historical or cultural interest which contribute positively to the landscape. Landscape condition - Landscape which is in a good physical state both with regard to individual elements and overall landscape structure. Associations - Landscape which is connected with notable people, events and the arts. Distinctiveness - Landscape that has a strong sense of identity. Recreational - Landscape offering recreational opportunities where experience of landscape is important. Perceptual (scenic) - Landscape that appeals to the senses, primarily the visual sense. Perceptual (wildness and tranquillity) - Landscape with a strong perceptual value notably wildness, tranquillity and/or dark skies Functional - Landscape which performs a clearly identifiable and valuable function, particularly in the healthy functioning of the landscape.	Very high	A designated landscape with statutory status (National Park or National Landscape). Valued landscape in the context of NPPF paragraph 187(a).
		High	A locally designated landscape supported by a detailed evidence base or with other strong indicators of value, which may include other relevant designations such as ancient woodland or conservation areas, with identified quality in the development plan or evidence base. May be considered valued landscape in the context of NPPF paragraph 187(a) with strong supporting evidence.
		Medium	Unlikely to be designated for landscape quality but may exhibit some indicators of value which are identified in the development plan or evidence base and are important at the community level.
		Low	Not designated for landscape quality and likely to exhibit few indicators of value which are identified in the development plan or evidence base.
		Very low	A landscape dominated by industry or infrastructure or which is damaged or degraded landscape, not designated for landscape quality and not likely to exhibit indicators of value which are identified in the development plan or evidence base.

Valued landscape

1.2.14 The fourth stage is to determine whether the receptor meets the threshold to be considered valued landscape. The principle of valued landscape in England is supported by the NPPF 2025 (Chapter 15) Paragraph 187) [11] which requires that planning policies and decisions should contribute to and enhance the natural and local environment by, inter alia, (a) "*protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan)*".

1.2.15 According to paragraph A4.2.11 of TGN 02/21 [10], a 'valued landscape' is an area identified as having sufficient landscape qualities to elevate it above other more everyday landscapes. There is therefore a high bar for an area to be considered valued landscape in the context of the NPPF.

1.2.16 Paragraph A4.2.5 of TGN 02/21 [10] states that, "*where a landscape has a statutory status, such as a National Park or AONB, it is self-evident that it is a valued landscape*". Therefore, where such landscapes are present within the study area, these are recognised as valued landscapes in the context of the NPPF.

1.2.17 A different approach is taken to determine whether landscapes outside of nationally designated landscapes can be considered valued landscape in the context of the NPPF. Paragraph A4.2.6 of TGN 02/21 [10] states that the interpretation of 'identified quality in the development plan' is not clear and that there are two fundamentally different interpretations that have been adopted by inspectors, which are considered below in more detail:

1. It means non-statutory, locally designated landscapes.
2. It means any landscape where there is evidence to justify the identification of a 'valued landscape'. Local designation alone may not be sufficient evidence.

1.2.18 For a landscape without statutory status to be considered valued landscape in the context of the NPPF it must be supported by strong evidence. The LVIA therefore considers each of the criteria set out in Table 1-5, references in Local Plan policy and evidence base, including whether there are existing local landscape designations in forming an overall judgement. Landscapes with high value may also be considered valued landscape.

Susceptibility of landscape receptors to change

1.2.19 GLVIA3 [3] paragraph 5.40 defines the susceptibility to change of landscape receptors as: "*the ability of the landscape receptor (whether it be overall character or condition of a particular landscape type or area, or an individual element and/or features, or a particular aesthetic and perceptual aspect) to accommodate the Proposed Development without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies*" (paragraph 5.40). LI TGN 01/24 notes that "*landscape susceptibility will vary with the type or nature of change*".

1.2.20 The features and characteristics which are more or less susceptible to the type of changes proposed are set out for each landscape receptor. The supporting narrative provides a clear explanation based upon analysis of the landscape receptor and the extent to which it is able to accommodate the type of change

arising from the specific proposal. The susceptibility to change is then categorised with reference to the criteria in Table 1-6.

Table 1-6 Susceptibility of landscape receptors to change

Criteria	Description
Very high	The type of change arising from the specific proposal are very likely to lead to undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
High	The type of change arising from the specific proposal are likely to lead to undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
Medium	The type of change arising from the specific proposal may lead to undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
Low	The type of change arising from the specific proposal are unlikely to lead to undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
Very low	The type of change arising from the specific proposal are very unlikely to lead to undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.

1.2.21 The overall sensitivity of each landscape receptor is defined by combining professional judgements on the value attached to the landscape and its susceptibility to change, supported by a clear narrative. Reference is made to the criteria set out in Table 1-7.

Table 1-7 Sensitivity of landscape receptors

Criteria	Description
Very high	Landscapes with statutory status or national policy protection with very limited ability to accommodate the type of change without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
High	Landscapes which may be locally designated or otherwise supported by a detailed evidence base or landscape with other strong indicators of value with limited ability to accommodate the type of change without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
Medium	Landscapes which are unlikely to be a designated for landscape quality but may exhibit some indicators of value and which may have some ability to accommodate the type of change without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
Low	Not designated for landscape quality and likely to exhibit few indicators of value and likely to accommodate the type of change no or limited undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.

Criteria	Description
Very low	Landscapes of very low value able to accommodate the type of change without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.

Magnitude of landscape impacts

1.2.22 Paragraph 3.28 of GLVIA3 [3] notes that magnitude is informed by combining considerations relating to the scale, extent and duration of impacts. This includes the geographical extent of influence, the spatial extent of the impact, the level of integration of new features with existing elements, its duration and degree to which the impact is reversible.

1.2.23 In summarising the magnitude of landscape impacts, reference is made to the following:

1. Size and scale – the degree to which key characteristics or features identified in the baseline would change.
2. Geographical extent – the area over which the change would occur.
3. Duration and reversibility – the time over which the change would occur and if these changes are reversible, set out on the following scale: short (weeks); medium (months); and long (years).

1.2.24 LI TGN 01/24 suggests that the size/scale of impacts is likely be the most important factor (3(3)). In point 5(11) it goes on to suggest that geographical extent should reflect the relevance of the location and that the spread of effects should be used as a 'modifier' to the scale of effect so that it does not understate the magnitude of effects for extensive receptors such as large character areas or designations. This is the approach taken in this assessment.

1.2.25 The criteria set out in Table 1-8 are referred to in determining the magnitude of landscape impacts.

Table 1-8 Magnitude of landscape impacts

Criteria	Description
Very high	Substantial changes to key characteristics across most of the area or to unique and distinctive features at a local level. May be longer term impacts, permanent or reversible.
High	Changes to the character of the landscape across large parts of the area or to distinctive features at a local level. May be longer term impacts, permanent or reversible
Medium	Changes to the character of the landscape across parts of the area or to some existing features at a local level. May be medium term impacts, permanent or reversible.
Low	Slight change to landscape character or landscape features across a small area. May be short to medium term impacts, permanent or reversible.
Very low	Barely perceptible change to the landscape receptor or may impact a limited area or no key characteristics. May be short-term impacts, permanent or reversible.

1.2.26 There may be cases where there would be no impacts on a receptor, for example where the design of the Proposed Development has been changed to avoid such impacts. In such cases this is recorded as no change.

Significance of landscape effects

1.2.27 The approach to assessing the significance of landscape effects is common with the approach for visual effects. This is set out in detail in paragraphs 1.2.52 to 1.2.63.

Assessment of visual effects

Visual baseline

Zones of Theoretical Visibility

1.2.28 Two types of Zone of Theoretical Visibility (ZTV) have been prepared with an assumed viewing height of 1.6m above-ground level in line with paragraph 6.11 of GLVIA3. [3]. The first is based on bare earth Digital Terrain Model (DTM) data to represent the worst case scenario and to assist with scoping areas out of the assessment where the Proposed Development would not be visible. The second includes existing built form derived from Ordnance Survey MasterMap. Woodland blocks derived from the National Forest Inventory are added to the terrain and extruded based on average heights derived from a 2m Digital Surface Model (DSM). There are limitations in what ZTVs can show and these maps do not take account of the screening effect of small blocks of vegetation such as hedgerows and vegetation in gardens. The true extent of visibility in winter and summer is therefore assessed through fieldwork and described in the baseline. These ZTVs also do not indicate how much of the Proposed Development would be visible. The purpose of the ZTV is to:

1. Identify the theoretical extents of visibility of the Proposed Development i.e. areas from which it would not be visible and areas from which it could potentially appear in existing views.
2. Assist in the iterative process of design and the refinement of the study area.
3. Identify visual receptors likely to be affected by the Proposed Development.
4. Identify locations that are representative of the views experienced by visual receptors at different locations within the study area (representative viewpoints).
5. Inform the design, including the extent and type of mitigation.

1.2.29 ZTVs are generated by Geographic Information System (GIS) computer software using open-source LiDAR Digital Terrain Model (DTM) data with a 2m resolution, offset by 1.6m to represent the eye height of an average person as defined in paragraph 6.11 of GLVIA3 [3]. This DTM is combined with three-dimensional models of the Proposed Development representing the maximum height, scale and location of the construction elements and Above Ground Plant (AGP), including the Water Recycling Plant (WRP) site.

Visual receptors and representative viewpoints

1.2.30 Visual receptors are defined in GLVIA3 [3] as "*individuals and/or defined groups of people who have the potential to be affected by a proposal*". This includes, for example, residents, users of public rights of way and motorists.

1.2.31 Visual receptors likely to experience views of the Proposed Development have been identified through interrogation of the ZTV, desk study analysis of maps, aerial and Google Street View photography, and fieldwork surveys. They have subsequently been categorised into the following types:

1. Residents
2. People travelling through the area on Public Rights of Way
3. People travelling through the area on promoted recreational routes and quiet lanes
4. People travelling through the area on local roads
5. People travelling through the area on major routes and public transport
6. Tourists
7. People using parks and open spaces
8. People working outdoors
9. People working indoors

1.2.32 Where a collection of visual receptors in the same category are likely to experience similar views, they have been grouped, as set out in ES Appendix 13.4 Visual baseline and effects, Volume II (Document reference 6.2, DCO Volume 6).

1.2.33 The Landscape Institute clarified the extent to which the views of residents fall within the scope of LVIA in 6(1) of LI TGN 01/24. It explains that views from houses and individual properties are a matter of private amenity, noting that it is an established planning principle that there is no right to a view. It states that "*LVIA should consider views from local communities focusing on the way that a community currently experiences views from public locations such as streets and open spaces and how those will change*" and that "*it may be helpful for an LVIA to comment on changes to views that will be experienced from groups of properties, or in some cases individual properties, if these changes are likely to be significant.*" The LVIA has not identified residual effects on visual receptors which would be major adverse (the highest level of significance) during operation and therefore the threshold for residential visual amenity has not been breached and a Residential Visual Amenity Assessment (RVAA) is not required.

1.2.34 Representative viewpoints have been identified within the ZTV to assist in describing the baseline view and the effects likely to be experienced by visual receptor groups. These representative viewpoints have been selected on the basis that they cover a range of viewing distances, elevations, and orientations from locations with different viewing experiences of the Proposed Development. They have been agreed with relevant local planning authorities as noted in section 13.3 of ES Chapter 13 Landscape and visual, Volume I (Document reference 6.1, DCO Volume 6). The selection of representative viewpoints has been informed by the following criteria:

1. Accessibility to the public

2. Number and sensitivity of people whose can be affected
3. Viewing direction, distance, openness and elevation
4. Nature of the viewing experience

1.2.35 As requested by the SDNPA, each viewpoint has been categorised into either falling within the SDNP, falling within its setting or falling in areas outside of the designated area or its setting.

1.2.36 Photographs taken at each viewpoint during fieldwork surveys in winter and summer are presented in ES Figure 13.23 Viewpoint photography, Volume III (Document reference 6.3, DCO Volume 6) to help demonstrate the nature of baseline views including the extent of existing screening. The referencing of photographs follows the Planning Inspectorate's advice on the Preparation and Submission of Application Documents for Nationally Significant Infrastructure Projects (NSIP) [12]. The location of each viewpoint is identified in ES Figure 13.22 Representative viewpoint, Volume III (Document reference 6.3, DCO Volume 6) and specifications of the camera and type of lens used are provided in ES Appendix 13.4 Visual baseline and effects, Volume II (Document reference 6.2, DCO Volume 6).

1.2.37 All photographs and photomontages are prepared in accordance with Landscape Institute TGN 06/19 [13]. Baseline photographs are presented as Type 1 annotated photographs. Type 4 photomontages are also prepared for selected viewpoints to illustrate the likely extent and nature of changes in baseline views. Additional detail on the methodology for the preparation of photomontages is provided in section 1.4 of this appendix.

Sensitivity of visual receptors

1.2.38 Paragraph 6.31 of GLVIA3 [3] states that "*each visual receptor, meaning the particular person or group of people likely to be affected at a specific viewpoint, should be assessed in terms of both their susceptibility to change in views and visual amenity and also the value attached to particular views*." The sensitivity of visual receptors results from a combination of parameters, such as:

1. The activity/occupation/pastime of the receptors at particular locations
2. The extent to which their attention or interest may be focused on the views
3. The visual amenity they experience

1.2.39 Consideration is also be given to the:

1. Location, focus and orientation
2. Features or characteristics of value within the view
3. Principal or secondary interests
4. Static or kinetic nature of views
5. Duration of the view

1.2.40 Judging the sensitivity of visual receptors is a two-part process of assessing the:

1. Value attached to views – relates to the existing landscape and is determined at the baseline stage in line with paragraph 5.19 of GLVIA3 [3], which states

that "*as part of the baseline description the value of the potentially affected landscape should be established*".

2. Susceptibility to change – which is considered in relation to the Proposed Development.

Value attached to views

1.2.41 A three-stage process is used to determine the value attached to views. This relates to the features and characteristics of the baseline landscape within the view and other indicators of value, including reference in policy, guide books, literature or art:

1. Stage 1: Identify if the view or the landscape within the view is covered by any relevant policy or designations and note features and characteristics of value with reference to the landscape baseline.
2. Stage 2: Identify if the view is identified on maps, is likely to be from a popular visitor location or has historical or cultural importance or associations.
3. Stage 3: Determine the value attached to the view with reference to the criteria provided in Table 1-9, using the evidence from stages 1 and 2.

Table 1-9 Value attached to views

Criteria	Description
Very high	Views within or across nationally or internationally designated landscapes and/or specific views designated in national or regional policy. Views are likely to have few or no detracting features and which may also have strong cultural associations supported by evidence, which could include links to historical events or people, representation in art or literature, for example.
High	Views within or across regionally or locally designated landscapes, or landscapes with strong indicators of value, or views identified in the development plan or evidence base. Views are likely to have few or no detracting features and may also have some cultural associations supported by strong evidence.
Medium	Views across landscapes which are unlikely to be designated but may exhibit some indicators of value which are identified in the development plan or evidence base and are important at the community level. Views may have some detracting features and cultural associations supported by evidence.
Low	Views across landscapes which are not designated for landscape quality and likely to exhibit few indicators of value which are identified in the development plan or evidence base. Views are likely to have some detracting features and lack cultural associations supported by evidence.
Very low	View across landscapes which are neither designated, nor identified in the development plan or evidence base, and without cultural associations. The landscape in the view is in poor condition or notably detracts from the experience of the view.

Susceptibility of visual receptors to change

1.2.42 The sensitivity of visual receptors is also dependent upon their susceptibility to changes in views and the visual amenity they experience at particular locations.

1.2.43 Paragraph 6.32 of GLVIA3 [3] explains that "*the susceptibility of different visual receptors to changes in views and visual amenity is mainly a function of:*

- *The occupation or activity of people experiencing the view at particular locations; and*
- *The extent to which their attention or interest may therefore be focussed on the views and the visual amenity they experience at particular locations*."

1.2.44 It is noted in GLVIA3 [3] that visual receptors most susceptible to change, include residents and visitors engaged in outdoor recreation "*whose attention or interest is likely to be focused on the landscape and on particular views*" (paragraph 6.33).

1.2.45 Table 1-10 sets out the criteria which are referred to in determining the susceptibility of visual receptors to the Proposed Development.

Table 1-10 Susceptibility of visual receptors to change

Criteria	Description
Very high	Visitors to nationally or internationally designated landscapes, particularly at specific viewpoints or viewing places, where views of the landscape are fundamental to the experience. People engaged in specific activities for enjoyment of dark skies.
High	Residents at home. Visitors to tourist hotspots, heritage assets or other attractions outside of nationally or internationally designated landscapes, particularly at specific viewpoints or viewing places, where views of the landscape are important to the experience. People engaged in outdoor recreation whose attention or interest is likely to be focussed on the landscape and on particular views, for example those using promoted walking and cycling routes. People travelling along promoted scenic routes.
Medium	People engaged in outdoor recreation or travelling along public rights of way or local roads, which are not promoted routes but where an appreciation of the surrounding landscape are relevant to the experience. People working outdoors.
Low	People engaged in outdoor sport or recreation which does not involve or depend upon appreciation of views of the landscape People travelling on major road, rail or other transport routes which are not recognised as scenic routes.
Very low	People working indoors and in industrial areas.

Summarising the sensitivity of visual receptors

1.2.46 The sensitivity of visual receptors is based on professional judgement and is informed by the criteria in Table 1-11, considering the value attached to views and susceptibility of visual receptors to the changes proposed.

Table 1-11 Sensitivity of visual receptors

Criteria	Description
Very high	Activity where views are fundamental to the experience and are related to landscapes with national or international designation and with few or no detracting features and which may also have strong cultural associations supported by evidence.
High	Activity resulting in a particular interest or appreciation of the view and/or views within or across regionally or locally designated landscapes, or landscapes with strong indicators of value, or views identified in the development plan or evidence base with few or no detracting features and may also have some cultural associations supported by strong evidence.
Medium	Activity resulting in a general interest or appreciation of the landscape and/or a view, likely to exhibit some indicators of value which are identified in the development plan or evidence base and are important at the community level.
Low	Activity where interest or appreciation of the view is secondary to the activity or the period of exposure to the view is limited, and/or views across landscapes which are not designated for landscape quality and likely to exhibit few indicators of value and likely to have some detracting features and lack cultural associations supported by evidence.
Very low	Activity where interest or appreciation of the view is inconsequential to their activity, and/or across landscapes which are neither designated, nor recognised in policy, and without cultural associations or is in poor condition or notably detracts from the experience of the view.

Magnitude of visual impacts

1.2.47 The magnitude of visual impacts relates to the extent to which the baseline view would change as a result of the Proposed Development. This assessment is made with reference to photographs and photomontages from the representative viewpoints.

1.2.48 Reference is made to the following in summarising the magnitude of visual impacts:

1. Size and scale – loss of existing features or addition of new features.
2. Geographical extent – where the proposed changes would be visible and the extent of the visual receptor affected.
3. Duration and reversibility – the time over which the change would occur and if these changes are reversible, set out on the following scale: short (weeks); medium (months); and long (years).

1.2.49 LI TGN 01/24 suggests that the size/scale of impacts is likely be the most important factor (3(3)). In point 5(11) it goes on to suggest that geographical extent should reflect the relevance of the location and that the spread of effects should be used as a 'modifier' to the scale of effect so that it does not understate the magnitude of effects for extensive receptors such as large character areas or designations.

1.2.50 The criteria set out in Table 1-12 are referred to in determining the magnitude of visual impacts.

Table 1-12 Magnitude of visual impacts

Criteria	Description
Very high	The Proposed Development would result in extensive changes to the character and composition and would become the dominant feature of the landscape within the view. There may be longer term impacts, permanent or reversible.
High	The Proposed Development would change the character and composition of large parts of the landscape within the view. There may be longer term impacts, permanent or reversible.
Medium	The Proposed Development would change the character and composition of discrete parts of the landscape within the view. There may be medium term impacts, permanent or reversible.
Low	The Proposed Development would cause small changes to the character and composition of the landscape within the view. There may be short to medium term impacts, permanent or reversible.
Very low	The Proposed Development would cause barely perceptible changes in the character and composition of the landscape within view. May be short-term impacts, permanent or reversible.

1.2.51 There may be cases where there would be no impacts on a receptor, for example where the design has been changed to avoid such impacts. In such cases this is recorded as no change.

Significance of landscape and visual effects

1.2.52 The approach to determining the significance of landscape effects and visual effects and whether these effects are considered likely significant in EIA terms is the same.

1.2.53 Judgements on the sensitivity of each receptor and the magnitude of impact are combined to establish the significance of effect and whether effects are considered likely significant in EIA terms. There are important distinctions between these two terms:

1. Significance of effect relates to the level recorded for any effect, with reference to the matrix set out in Table 1-13.
2. Likely significant effects are those which are considered most important in the decision-making process. An effect in this LVIA is considered 'likely significant' in EIA terms if it is of major or moderate significance. All other effects are categorised as 'not likely significant'.

1.2.54 Table 1-13 has been used to guide judgements on the relationship between the sensitivity of a visual receptor, the magnitude of impact and the resulting significance of effect. Where conclusions differ from this guide, a reasoned explanation is provided in the assessment text.

Table 1-13 Significance of landscape and visual effects

		Magnitude of impact				
		Very high	High	Medium	Low	Very low
Sensitivity	Very high	Major	Major	Major or Moderate	Moderate	Moderate or Minor
	High	Major	Major or Moderate	Moderate	Moderate or Minor	Minor
	Medium	Major or Moderate	Moderate	Moderate or Minor	Minor	Minor or Negligible
	Low	Moderate	Moderate or Minor	Minor	Minor or Negligible	Negligible
	Very low	Moderate or Minor	Minor	Minor or Negligible	Negligible	Negligible

1.2.55 The identification of the likely significant effects on landscape and visual receptors is supported by detailed analysis and the professional judgement of competent experts, and consultation with stakeholders. In cases where this table provides two potential categories of significance, a reasoned justification is provided to explain which category has been applied and why effects are considered significant or not significant. Table 1-14 defines what the significance of effect terms means in terms of beneficial and adverse effects.

Table 1-14 Descriptions of landscape and visual effects

Significance of effect	Landscape effects	Visual effects
Major beneficial	Effects that result in a considerable improvement of the existing landscape resource. Valued characteristic features would be restored or reintroduced as part of the development.	Effects that result in a substantial improvement in the existing view.
Moderate beneficial	Effects that result in a partial improvement of the existing landscape resource. Valued characteristic features would be largely restored or reintroduced.	Effects that result in a noticeable improvement in the existing view.
Minor beneficial	Effects that result in a slight improvement of the existing landscape resource. Characteristic features would be partially restored.	Effects that result in a limited improvement in the existing view.
Negligible beneficial	Effects that result in a very slight improvement to the existing landscape resource, not uncharacteristic within the receiving landscape.	Effects that result in a barely perceptible improvement in the existing view.
Neutral	Effects which are a balance between adverse and beneficial effects and are neutral in their consequences for the landscape.	Effects that are a balance between adverse and beneficial effects and are neutral in their consequences for the view of visual receptors.

Significance of effect	Landscape effects	Visual effects
Negligible adverse	Effects that result in a very slight deterioration to the existing landscape resource, not uncharacteristic within the receiving landscape.	Effects that result in a barely perceptible deterioration in the existing view.
Minor adverse	Effects that result in a slight deterioration of the existing landscape resource. Characteristic features would be partially lost.	Effects that result in a limited deterioration in the existing view.
Moderate adverse	Effects that result in a partial deterioration of the existing landscape resource. Valued characteristic features would be largely lost.	Effects that result in a noticeable deterioration in the existing view.
Major adverse	Effects that result in a considerable deterioration of the existing landscape resource. Valued characteristic features would be wholly lost.	Effects that result in a substantial deterioration in the existing view.

1.2.56 Whether effects are adverse, beneficial or neutral is determined by considering the way in which the changes are likely to affect the baseline.

1.2.57 Adverse effects are likely to occur where the Proposed Development introduces new elements or changes which are discordant or intrusive resulting in a deterioration to existing character or valued features of the landscape or of views and visual amenity.

1.2.58 Beneficial effects are likely to occur where the Proposed Development enhances the character of the landscape or existing views.

1.2.59 Paragraphs 5.37 and 6.29 of GLVIA3 [3] state that is possible for effects to be neutral in their consequences for landscape and for visual receptors. Where a judgement of neutral effects is reached, reference is made to the contribution of the Proposed Development to the baseline and acknowledging the positive and negative topics which have been considered.

1.2.60 Where the assessment concludes that there would be no impacts on a receptor, this is reported as no effect. This may, for example, be a consequence of changes to the design which has avoided impacts on receptors identified at the scoping stage.

1.2.61 Residual effects are those which would remain even with primary mitigation at construction and Year 15 of operation and which cannot be mitigated by design or other measures in this time period.

Assessment of night time effects

1.2.62 A qualitative assessment of night time lighting effects for landscape and views has been informed by fieldwork carried out in winter and summer 2024. This is also described in the narrative for each landscape and visual receptor.

1.2.63 The assessment of night time lighting effects makes reference to qualitative changes likely to be brought about by the Proposed Development for each landscape and visual receptor where relevant. An assessment of the likely effects

on the Moore's International Dark Sky Reserve within the SDNP has been undertaken with reference to the SDPNA Dark Skies TAN and the South Downs Lightscape Management Plan [9].

1.3 Approach to mitigation and residual effects

Mitigation

1.3.1 The LVIA is key to achieving the criteria for good design set out in section 3.6 of the NPSWRI [1].

1.3.2 The most effective mitigation for adverse landscape and visual effects is to avoid impacts at source as part of the design process, for example through the siting of infrastructure. This has included avoiding direct impacts within the SDNP. Where effects cannot be avoided, the hierarchy is that impacts should be rectified, reduced or finally offset. Landscape mitigation forms an inherent part of the design and therefore all landscape mitigation for operational effects is considered primary and no secondary mitigation is proposed in line with paragraph 4.23 of GLVIA3 [3].

1.3.3 Mitigation principles to avoid or reduce potential construction effects of the Proposed Development have focused on reducing the duration and footprint of construction activity through the scheme development process. This includes locating development in the least prominent positions and wherever practicable maximising the distance from nearby visual receptors. Other measures which have been considered include positioning the works to make use of existing natural features such as landform and vegetation to screen views.

1.3.4 The Proposed Development is being designed to avoid or reduce the loss of existing landscape features of value, such as trees, woodland, and hedgerows wherever practicable. Any loss would be mitigated with replacement planting as close to the location, type and character of the existing vegetation to reduce effects resulting from such losses, with due regard to wayleave requirements.

1.3.5 An AIA is included in ES Appendix 13.5 Arboricultural Impact Assessment, Volume II (Document reference 6.2, DCO Volume 6). The assessment of the impact on landscape features has been informed by the AIA and detailed habitat surveys, including hedgerow surveys completed in summer 2024, which are summarised in ES Chapter 8 Terrestrial and freshwater biodiversity, Volume I (Document reference 6.1, DCO Volume 6). The details for each LLCA are provided in ES Appendix 13.3 Landscape baseline and effects, Volume II (Document reference 6.2, DCO Volume 6).

1.3.6 Loss of ancient woodland would be avoided wherever practicable, in line with section 4.3.18 of the NPSWRI [1], which states that "*the Secretary of State should not grant development consent for any development that would result in the loss or deterioration of irreplaceable habitats including ancient woodland and the loss of ancient or veteran trees found outside ancient woodland, unless there are wholly exceptional reasons for the development, and a suitable compensation strategy exists*".

1.3.7 The design also identifies opportunities for landscape restoration and enhancement, by introducing planting which repairs or reinforces existing vegetation patterns and contributes to Biodiversity Net Gain (BNG). Beneficial

effects would be maximised wherever practicable, for example through the design of multi-functional Green Infrastructure which provides a range of ecosystem services to deliver Environmental Net Gain (ENG). Full detail is provided in the Biodiversity Gain Plan (Document reference 7.11, DCO Volume 7) and the Environmental Net Gain (ENG) Statement (Document reference 7.13, DCO Volume 7).

1.3.8 The Outline Landscape and Ecology Management Plan (Document reference 7.5, DCO Volume 7), sets out details on the measures that will be applied to ensure the successful implementation and establishment of proposed planting, which forms part of the mitigation of the likely landscape and visual effects of the Proposed Development.

Residual effects

1.3.9 It would take time for planting proposed to reinstate vegetation lost as a consequence of construction or provided to mitigate other effects of the Proposed Development, for example for visual screening. Therefore, landscape and visual effects have been scoped in and are assessed at Year 1 (winter, worst case) and Year 15 of operation (summer) to consider the effectiveness of the proposed mitigation.

1.3.10 Effects which persist after the mitigation set out in ES Chapter 13 Landscape and visual, Volume I (Document reference 6.1, DCO Volume 6) has been applied are considered residual effects. For construction, this relates to the effects that would persist after the tertiary measures described have been applied. For operation, this relates to the effects that would persist at Year 15 of operation when proposed planting is assumed to have become fully established. Opportunities for advanced planting would be sought where this is practicable as this would allow for early establishment of mitigation.

1.4 Photography, surveying and visualisation methodology

Baseline photography

1.4.1 Baseline photographs from each viewpoint are provided to show the existing 'baseline' conditions, with photography taken both in winter (when deciduous vegetation is not in leaf, therefore views across the landscape are at their most open), and summer (when deciduous vegetation is in leaf, and views across the landscape are more limited). Baseline photography is presented as 90-degree panoramas on an A1 sheet in compliance with the Landscape Institute's Technical Guidance Note 06/19 Visual Representation of Development Proposals (LI TGN 06/19) [13]

Verifiable photomontages

1.4.2 Verified photomontages have been provided for selected viewpoints to accurately visualise the locations and Limits of Deviation of the Proposed Development in winter of year 1 of operation and summer of year 15 of operation. Presenting both baseline photography and photomontages reveal the likely extent of change resulting within each view, helping to convey how the Proposed Development, for

example through the introduction of new built elements or structures, changes in ground level, and loss of vegetation or other landscape features.

1.4.3 LI TGN 06/19 sets out two classification systems relevant to visualisations, both of which are summarised below.

1.4.4 The guidance primarily classifies visualisations as 'Type 1, Type 2, Type 3 and Type 4', the definitions of which are mostly to do with the degree of accuracy and sophistication in the location and scaling of a representation of the proposal. The LVIA presents the following:

1. 'Type 1 – Annotated Viewpoint Photograph': these simply show the extent of the site within the view, and annotate any key features within the view, overlaid onto photographic context.
2. 'Type 4 – Photomontage/Photowire (survey/scale verifiable)': visualisations overlaid onto a photographic base with 'the highest level of accuracy and verifiability'; quantifiable verification data and procedural transparency must be provided.

1.4.5 The guidance also refers to the London View Management Framework (2012) (LVMF) levels of 'Accurate Visual Representations' (AVR) classification, which are based on the degree of sophistication of the graphic imagery (as opposed to the degree of accuracy and transparency of location and scaling) used to represent the Proposed Development:

1. 'AVR Level 0': location and size only, i.e. 'photowire', or 'wireline', showing the outline of the location and extents of a proposal overlaid onto a photograph base.
2. 'AVR Level 1': location, size, and degree of visibility, i.e. the basic massing of the proposal is shown within the 3D context of the photograph base; graphic editing is undertaken so that any elements the proposal which would sit behind elements of the landscape within the photograph are masked out of view.
3. 'AVR Level 2': as level 1, with additional representation of architectural form. Adds a level of detail to the representation of the proposals, such as doors, windows, floors, roofs (for buildings), and the form and shading of the development within its context.
4. 'AVR Level 3': as level 2, with additional 'photo-realistic' rendering of surface textures, colours, reflections and shading.

Viewpoint photography specification

1.4.6 Baseline photographs for LI Type 1 annotated photographs were taken by landscape architects using a tripod with a panoramic head and camera mounted GPS unit. All baseline photographs for LI Type 4 photomontages were taken by specialist professional photographers. Each viewpoint location was accurately surveyed and identified using British National Grid co-ordinates.

1.4.7 The heights and distances of points within each view that are easily distinguishable were recorded as a British National Grid and level datum and their geospatial accuracy was checked relative to the fixed camera position.

1.4.8 The survey points for each view provided an effective check for ensuring that the 3D model and existing views were accurately merged.

1.4.9 A Panoramic ('Pano') Head, mounted on top of a tripod, controlled the angle between adjacent photographs. With a 50mm lens of approximately 39.6° view angle and a setting of 15° interval between each photo. This minimised edge distortion and helps guide the view angle of any given panoramic shots.

Data requirements

1.4.10 For all photographs, the following data was recorded:

1. EXIF data, which is provided in the file properties
2. Focal length
3. Aperture, shutter speed, ISO
4. Lens and camera body
5. Date and time
6. Other data (marked on each file in a separate layer):
    a. Focal length (to three decimal places where applicable)
    b. The lens axis
    c. The details of height over survey point (between 1.55m and 1.70m high)
    d. Field of view
    e. Image dimensions
    f. Film gate size
    g. Date and time

Viewpoint survey specification

1.4.11 For LI Type 4 photomontages, each individual observation set-up achieved an accuracy of + or – 45mm to British National Grid/datum. All superimposed elements were positioned accurately within each image by using the data supplied by the surveyors. Each image has a minimum of 10-12 clearly defined detail points taken across the width of the image and at near, mid and far distance (i.e. a balance of points in the photograph). Any clearly defined point can be used (e.g. corners of road markings, features on road signs, corners of building tops or roofs, window corners etc.). The point numbers recorded are unique and relate to the viewpoint number. All final panoramic images have a minimum vertical field of view (VFoV) of 27 degrees.

1.4.12 A DWG file was provided by the surveyors containing the detail points and camera positions as vertical lines. A spreadsheet of the coordinated points was provided (including the camera locations) with annotated descriptions.

1.4.13 The field survey equipment used is as follows:

1. Total Station Electronic Theodolite
2. TCR1205BT R1000 (1205+) equipped with Bluetooth Tripods
3. (x3) Wooden GST20-09 Traverse
4. Forced centring tribrach GDF122 – Pro
5. Spigots GRT144

6. Prism Carriers GPH1
7. Circular Prisms GPR1
8. GPS Antenna: ATX1230 Glonass equipped and enabled
9. GPS handheld controller: RX1250XC
10. Carbon Fibre Prism Pole and GPS controller mount for SmartRover Operation

1.4.14 The GPS equipment is connected to the Leica Smartnet software on the Internet via an onboard mobile phone. This enables a real-time solution to following accuracy:

1. The horizontal accuracy is 10mm+ 1ppm.
2. The vertical accuracy is 20mm + 1ppm.

Model quality and accuracy

1.4.15 The preliminary, outline nature of the design of the Proposed Development means that LVIA and the supporting visualisations apply the 'Rochdale Envelope' principle. They are based on the assumption that all development would be built out to the full extent of the Limits of Deviation of design, to represent the 'worst case scenario'.

1.4.16 Three-dimensional (3D) models of the Proposed Development have been used, representing the Proposed Development design at the time of DCO application. The model topography is based on a digital terrain model of the site, incorporating additional features such as designed earthworks, proposed building massing, and, where appropriate for LI Type 4 photomontages, detailed trees and vegetation.

1.4.17 The verification process confirms the accuracy of the 3D model in relation to each existing view. The details of the British National Grid co-ordinates for each viewpoint and the angle of each view were checked. The process involved accurately positioning the 3D model of the proposed development within each existing view. This was achieved through a process of matching the surveyed points in the digitised image with those recorded by the survey team on the existing photographs.

1.4.18 The survey points and specifications of the lens type relating to each existing view were entered into 3DS Max software. The survey points of the camera position and those relating to specified objects within each baseline image were then highlighted on the digitised image.

1.4.19 This additional check ensured that the survey points matched precisely. Once the process of camera matching was complete, the 3D model of the proposed development was accurately positioned within each of the existing views. This was achieved by rendering the camera matched 3D of the Proposed Development within 3DS Max software at the same size as the digitised existing view.

Rendering

1.4.20 The 'Vray Rendering Engine' was chosen to execute the visualisations as it is the most used in the Architectural and Engineering visualisation industry. It utilises the 'physical Sun and Sky and Compass System' and provides physically accurate full global illumination solutions. This was used to produce accurate render of the 3D

elements which are used to produce the verified photomontage/photowire visualisations.

Recommended viewing

1.4.21 As outlined in section 2.1, panoramic views have been provided with a horizontal field of view of 90-degrees. LI TGN 06/19 [13] suggests this angle closely matches the horizontal field of view (HFoV) of human vision when looking ahead, making it effective for assessing potential visual changes in the landscape. 90-degree panoramas reduce distortion while still capturing context and helping to judge the scale and visual prominence of the Proposed Development.

1.4.22 A VFoV of 27.6 degrees has been used for these scaled panoramas, which emulates the VFoV of a 50mm lens. This is widely regarded to approximate the standard FoV of the human eye.

1.4.23 In accordance with LI TGN 06/19, viewing distances of approximately arm's length (typically between 500-550mm) are the most practical and widely used for printed visualisations. According to NatureScot's guidance "Visual Representation of Wind Farms" (Version 2.2, February 2017) similarly advises that images should be viewed at a comfortable arm's length. Care should be taken when viewing the images on a screen as this can distort and exaggerate the scale, revealing details that would not be visible with the naked eye. When viewed digitally, it is recommended that the image is enlarged so that it fills the full height of the screen to broadly replicate the intended scale and perspective. These approaches ensure that visualisations provide a reasonable impression of the scale of the development and the distance to the development and are fit for purpose in the LVIA.

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