

23. Mitigation measures and residual effects

23.1 Mitigation measures

- 23.1.1 This chapter summarises the incorporated mitigation measures identified within the individual topic chapters. It then outlines the residual likely significant effects which remain after all of the proposed mitigation which has been identified has been taken into account. This information is set out in each individual topic chapter but this **Chapter 23** draws this all together for the ease and understanding of the reader of this PEIR.
- 23.1.2 The proposed incorporated mitigation measures are taken from the tables identified within each topic chapter and they reflect the current evolving status of the Moorside Project design. The measures are presented in **Tables 23.1 to 23.18** below and they will be subject to further consideration and refinement as the project design is finalised and the EIA process continues in parallel to inform the design in accordance with good practice.
- 23.1.3 Full details of the proposed incorporated and additional mitigation which is proposed for the Moorside Project (taking into account significant cumulative effects with other development projects where appropriate) will be presented in the Environmental Statement (ES) which will accompany the DCO Application in 2017.
- 23.1.4 It should be noted that the DCO Application will be supported by a suite of documents (for example, an Outline Construction and Environmental Management Plan (CEMP)) that will detail how the proposed mitigation measures for the Moorside Project that are recommended in the ES will be implemented and also how the effectiveness of these measures will be monitored during the various project phases.

Table 23.1 Transport

Potential receptor	Predicted changes and potential effects	Incorporated measure
Common to all of the Moorside Project		
Road (and some rail) receptors		
Sensitive receptors	<p>Severance due to increased usage of highway by vehicles transporting construction materials or workers to, from and between the Moorside Project Sites.</p> <p>Congestion effects on the highway network.</p> <p>Fear and intimidation due to increased flows on the highway network.</p> <p>Safety concerns associated with increased traffic flows on the highway network.</p>	<p>Minimise the requirement for movements by road by:</p> <ol style="list-style-type: none"> 1. Encouraging direct to site rail transport from point of origin for UK supply chain to reduce HGV movements on the network. 2. Using sequencing and consolidation centres to reduce piecemeal loads. 3. Enforcing controls for construction workers by limiting private car access to all Moorside Project Sites to reduce vehicle demand. 4. Intercepting workers travelling to their accommodation at the Corkickle Site, Mirehouse Site and Egremont Site via shuttle coaches from the stations in Carlisle and Penrith or local train connections from Carlisle. 5. Seeking enhancements to key rail hubs between Barrow and Carlisle to encourage greater use of the scheduled service (workers to disembark at Sellafield station for coach shuttle transfer into the Moorside Site).

Potential receptor	Predicted changes and potential effects	Incorporated measure
		<p>6. Providing direct bus services from non-rail linked locations where clusters of workers are anticipated e.g. Cockermouth.</p> <p>7. Using coaches to transport workers from the Egremont Site, with connections by coach/bus from outlying settlements with no rail access.</p> <p>NuGen is developing a set of Transport Implementation Strategies which will seek to manage the timing of movements outside of the peaks when traffic flows are lower and there is more capacity on the network.</p> <p>Localised junction upgrades to provide additional capacity, provisions for pedestrians and improve safety.</p>
<p>Network user receptors</p>	<p>Journey delays and congestion effects due to an increase in traffic on the highway network.</p> <p>Safety concerns associated with increased traffic flows on the highway network.</p> <p>Congestion on side roads awaiting access onto the primary corridors.</p>	<p>Minimise the requirement for movements by road by:</p> <ol style="list-style-type: none"> 1. Encouraging direct to site rail transport from point of origin for UK supply chain to reduce HGV movements on the network. 2. Using sequencing and consolidation centres to reduce piecemeal loads. 3. Enforcing controls for construction workers by limiting private car access to all the Moorside Project Sites to reduce vehicle demand.

Potential receptor	Predicted changes and potential effects	Incorporated measure
		<p>4. Intercepting workers travelling to their accommodation at the Corkickle Site, Mirehouse Site and Egremont Site via shuttle coaches from the stations in Carlisle and Penrith, or local train connections from Carlisle</p> <p>5. Seeking enhancements to key rail hubs between Barrow and Carlisle to encourage greater use of the scheduled service (workers to disembark at Sellafield station for coach shuttle transfer into the Moorside Site).</p> <p>6. Providing direct bus services from non-rail linked locations where clusters of workers are anticipated e.g. Cockermouth.</p> <p>7. Using coaches to transport workers from the Egremont site, with connections by coach/bus from outlying settlements with no rail access.</p> <p>NuGen is developing a set of Transport Implementation Strategies, which will seek to manage the timing of movements outside of the peaks when traffic flows are lower and there is more capacity on the network.</p> <p>Localised junction upgrades to provide additional capacity, improve accessibility to the primary corridors, provisions for pedestrians and improve safety.</p>
Transport infrastructure	Accelerated deterioration in physical quality of highway network assets and infrastructure.	Minimise the requirement for movements by road by:

Potential receptor	Predicted changes and potential effects	Incorporated measure
		<ol style="list-style-type: none"> 1. Encouraging direct to site rail transport from point of origin for UK supply chain to reduce HGV movements on the network. 2. Using sequencing and consolidation centres to reduce piecemeal loads. 3. Enforcing controls for construction workers by limiting private car access to all Moorside Project Sites to reduce vehicle demand. 4. Intercepting workers travelling to their accommodation at the Corkickle Site, Mirehouse Site and Egremont Site e.g. from local train connections from Carlisle 5. Seeking enhancements to key rail hubs between Barrow and Carlisle to encourage greater use of the scheduled service (workers to disembark at Sellafield station for coach shuttle transfer into the Moorside Site). 6. Providing direct bus services from non-rail linked locations where clusters of workers are anticipated e.g. Cockermouth 7. Using coaches to transport workers from the Egremont site, with connections by coach/bus from outlying settlements with no rail access. <p>NuGen is developing a set of Transport Implementation Strategies, which will seek to manage the timing of movements outside of the</p>

Potential receptor	Predicted changes and potential effects	Incorporated measure
		peaks when traffic flows are lower and there is more capacity on the network.
Development at the Moorside Site only		
Rail Transport receptors		
Network user receptors	Journey delays due to an increased use of the rail network by freight and passengers.	<p>The provision of dedicated charter trains for construction workers to avoid overcrowding on public services.</p> <p>Use of spare train paths for freight to ensure no existing uses are affected.</p> <p>New rail infrastructure (including rail loops) will minimise the effects on journey delay by providing passing points to reduce impacts upon scheduled services.</p>
Marine Transport receptors		
Network user receptors	Disruption to shipping lanes due to marine traffic associated with the Moorside Site.	Shipping movements to be controlled by a Navigation Plan (which will form part of the NuGen Transport Strategy).
Development at the Corkickle Site and Mirehouse Site		
Rail receptors		
Network user receptors	Journey delays due to an increased use of the rail network by passengers utilising services from the Mirehouse Site and the Corkickle Site.	The provision of dedicated charter trains for construction workers to avoid overcrowding on public services.

Potential receptor	Predicted changes and potential effects	Incorporated measure
		New rail infrastructure (including rail loops) will minimise the effects on journey delay by providing passing points to reduce impacts upon scheduled services.
Corkickle to Mirehouse Railway and St. Bees Railway		
Network user receptors	Journey delays during construction	The construction period will not be protracted and will be concentrated where possible outside of peak times.
Highway Improvements		
Sensitive Users	Route obstruction or severance due to road closures or movement constraints.	Seek to ensure that access is maintained to residential properties where possible and that those affected are provided advanced warning and information on the impact.
Network user receptors	Severance and journey delays due to the construction of the highway improvement schemes and associated diversions or closures on the highway network during construction.	Where possible minimise disruption by maintaining one lane running and containing any road closures outside of the peak periods such as overnight. Seek to provide diversion routes for schemes which require road closures where possible or reduced running to ensure journey delay is minimised.

Table 23.2 Noise and Vibration

Potential receptor	Predicted changes and potential effects	Incorporated measure
Common to all sites		
All sensitive human receptors including those used for educational, commercial and leisure purposes (noise from construction)	Increase in ambient sound levels due to on-site construction activities, and road and rail traffic movements	<p>Use of screening bunds/acoustic fences; Use of best practice, as outlined within BS5228-1 e.g.:</p> <ul style="list-style-type: none">) use of quieter plant where possible;) use of appropriate silencers and enclosures around plant where possible;) avoid unnecessary revving of engines;) switch off plant when not required;) use of broadband reverse warning systems where applicable;) good maintenance of internal haul roads;) minimise materials drop heights;) use of hydraulic/continuous flight auger and/or 'soft start' piling techniques;) avoid metal to metal impacts during erection of steelwork; and) agreed traffic routing to sites to avoid where possible sensitive areas of population.

Potential receptor	Predicted changes and potential effects	Incorporated measure
<p>All sensitive human receptors including those used for educational, commercial and leisure purposes (vibration from construction)</p>	<p>Increased in ground borne vibration levels due to use of construction plant on site</p>	<p>Use of best practice, as outlined within BS5228-2 e.g.:</p> <ul style="list-style-type: none">) use low vibration plant such as hydraulic piling or continuous flight auger piling techniques;) use of low vibration compaction techniques;) good maintenance of haul road surfaces;) vibration isolation of plant from structural elements, where possible;) locate vibrating plant as far away from sensitive receptors as possible;) use of rock and concrete crushing techniques rather than pneumatic hammers for any demolition/break out activities;) use of cut off trenches where appropriate and HSE dictates;) use of continuous flight auger and/or 'soft start' piling techniques; and) agreed traffic routing to sites to avoid where possible sensitive areas of population.

Potential receptor	Predicted changes and potential effects	Incorporated measure
All sensitive human receptors including those used for educational, commercial and leisure purposes (operational noise & vibration)	Increased noise and vibration impacts during the operational phase	Use of best practice including: <ul style="list-style-type: none">) use of quieter plant where possible;) locating noisy plant within buildings or designed enclosures;) acoustic attenuators on exhaust stacks, ventilation intakes and discharge points;) use of vent silencers;) lagging of exposed pipework and valves; and) agreed traffic routing to sites to avoid where possible sensitive areas of population.

Table 23.3 Air Quality

Potential receptor	Predicted changes and potential effects	Incorporated measure
Common to all sites		
Residential properties, schools, care homes, healthcare facilities and other locations		
Where people may be exposed to changes in air quality	Fugitive dust soiling of surfaces arising from earthworks and other construction activities during dry periods of weather.	Application of dust suppression and control techniques and good site management practices to minimise the generation of fugitive dust emissions. This and other environmental measures will be set out in an outline Construction Environmental Management Plan

Potential receptor	Predicted changes and potential effects	Incorporated measure
		(CEMP). The CEMP will be secured via a requirement in the DCO for the Moorside Project.
	Changes in air quality caused by exhaust emissions to atmosphere from non-road mobile machinery (NRMM) during earthworks and construction activity.	Use of ultra-low sulphur diesel (ULSD) fuels (secured through the CEMP referred to above) and low emission vehicles and plant which incorporate the most stringent exhaust emission controls ¹ .
	Changes in air quality caused by exhaust emissions to atmosphere from changes in road traffic flows on the local and regional road networks and rail movements on the Cumbrian Coast railway during earthworks and construction activity.	Implementation of measures (set out in an outline Construction Traffic Management Plan (CTMP)) to minimise increases in road traffic movements during the earthworks and construction activities. The CTMP will be secured via a requirement in the DCO for the Moorside Project.
	Changes in air quality caused by exhaust emissions to atmosphere from fixed combustion plant and changes in rail and road traffic flows on the local and regional road networks as a result of operation of all the sites.	Implementation of measures to abate fixed combustion plant emissions and minimise increases in road traffic movements during operation of the sites by maximising the use of public transport. An outline green travel plan (GTP) will be provided.

¹ Stage IV of the "Non-Road Mobile Machinery (Emission of Gaseous and Particulate Pollutants) Regulations 1999" (Statutory Instrument No. 1999/1053) and subsequent amendments. The Regulations apply to new engines to be installed in non-road mobile machinery, intended and suited to move, or to be moved on the ground, either on or off the road.
<http://www.dft.gov.uk/vca/enforcement/non-road-mobile-mach.asp>

Potential receptor	Predicted changes and potential effects	Incorporated measure
Protected ecological sites, including those with International, European, National and Local status		
Which are sensitive to dust soiling and to exhaust emissions of nitrogen and sulphur oxides	Fugitive dust soiling of plant and ground surfaces arising from earthworks and other construction activities during dry periods of weather.	Application of dust suppression and control techniques and good site management practices to minimise generation of fugitive dust emissions, as set out in the CEMP referred to above. The CEMP will be secured via a requirement in the DCO for the Moorside Project.
	Changes in air quality caused by exhaust emissions to atmosphere from non-road mobile machinery (NRMM) during earthworks and construction activity.	Use of ultra-low sulphur diesel (ULSD) fuels (secured through the CEMP referred to above) and low emission vehicles and plant which incorporate the most stringent exhaust emission controls ¹ .
	Changes in air quality caused by exhaust emissions to atmosphere from changes in road traffic flows on the local and regional road networks and rail movements on the Cumbria Coast railway during earthworks and construction activity.	Implementation of measures (via the outline CTMP referred to above) to minimise increases in road traffic movements during the earthworks and construction activities. The CTMP will be secured via a requirement in the DCO for the Moorside Project.
	Changes in air quality caused by exhaust emissions to atmosphere from fixed combustion plant and changes in rail and road traffic flows on the local and regional road networks as a result of operation of all the sites.	Implementation of measures to abate fixed combustion plant emissions and minimise increases in road traffic movements during operation of the sites (Green Travel Plan - see above) by maximising the use of public transport.

Table 23.4 Landscape

Potential receptor	Predicted changes and potential effects	Incorporated measure
Common to all sites: Landscape elements		
Woodland/trees and hedgerows within site boundaries	Potential loss or damage to valued vegetation (including tree roots as a result of construction activities)	<p>Vegetation/tree/hedgerow survey (e.g. Hedgerow Regulations) and protection plans considered as part of the design process</p> <p>Construction activities to be carried out in accordance with <i>BS 5837:2012 Trees in relation to design, demolition and construction. Recommendations</i> in order to protect trees and other vegetation.</p> <p>New tree/woodland and hedgerow planting will be undertaken to replace those lost to the development at a proposed ratio of at least 1:2 and in accordance with a landscape masterplan for each site location. The design of new planting will be located to deliver further mitigation (screening and enhancing views) as well as forming part of a new landscape that will aim to be of a higher overall quality and value than the existing sites.</p>
Areas of grassland/moor/heath/wetland/coastline and estuary	Physical loss or alteration of valued landscape fabric	Design of new landscapes will incorporate new areas of grassland/moor/heath/wetland/coastline and estuary habitat and landscape character to those which may have been lost to the development, where appropriate.
Wetland/River and Coastal features	Physical loss or alteration of valued landscape features and focus	Design of new landscapes will incorporate areas of wetland/river and coastal features where

Potential receptor	Predicted changes and potential effects	Incorporated measure
		these have been lost to the development, where appropriate.
Landform	Physical loss or alteration of valued landform	In the case of the Moorside Site New landscape design of landforms created as part of wider landscape design and masterplan process will ensure that the new landform is designed to match existing lowland fells and topography, whilst also providing further mitigation in screening low level development. At other sites new landform will similarly be incorporated into a holistic landscape masterplan to ensure it is complementary to the landscape character of the completed development and provides additional mitigation (screening) where appropriate.
Dry stone walls/kests rock outcrops	Physical loss or alteration of traditional field boundaries	Consider retention/storage and reuse of materials such as stone to be re-used as part of the new landscape creating or re-building traditional features such as stone walls, kests and/or sculptural elements.
Landscape features of interest (bridges/buildings/man-made artefacts)	Physical loss or alteration of valued cultural aspects of the landscape	Consider the dismantling and storage on site (or other suitably agreed place) of any particularly valued features and there re-building/use within the new landscape as part of the overall landscape master plan for each site.
Common to all sites: Landscape character and Designations		
Landscape Character	Direct or indirect effects on valued characteristics, special qualities and character.	Incorporation of enhanced landscape/architectural design, the provision of a landscape masterplan, landscape management

Potential receptor	Predicted changes and potential effects	Incorporated measure
		<p>and/or off-site measures to reduce effects on landscape character and ensure the nature of these effects is neutral or positive as far as possible. In addition the baseline landscape character should be revised post construction to ensure that appropriate landscape character records are provided for any new areas of landscape character created by the proposed development.</p>
Seascape Character	Direct or indirect effects on valued characteristics, special qualities and character.	<p>Incorporation of enhanced landscape/architectural design, the provision of a landscape masterplan, landscape management and/or off-site measures to reduce effects on seascape character and ensure the nature of these effects is neutral or positive as far as possible. In addition the baseline seascape character should be revised post construction to ensure that appropriate character records are provided for any new areas of seascape character created by the proposed development.</p>
Townscape Character	Direct or indirect effects on valued characteristics, special qualities and character.	<p>Incorporation of enhanced landscape/architectural design, the provision of a landscape masterplan, landscape management and/or off-site measures to reduce effects on townscape character and ensure the nature of these effects is neutral or positive as far as possible. In addition the baseline townscape character should be revised post construction to ensure that appropriate character records are provided for any new areas of townscape</p>

Potential receptor	Predicted changes and potential effects	Incorporated measure
		character created by the proposed development.
Landscape/Seascape/Townscape Character (key characteristics) and the special qualities of landscape designations	Potential changes to night-time character as a result of lighting introduced during both the construction and operational periods.	<p>The following are considered important in the design of a lighting strategy for the proposed development across all sites:</p> <p>The minimum levels of light required to safely perform the required tasks are to be identified through reference to British Standards Codes of Practice and other relevant industry guidance. The number of lighting columns to be introduced will be the minimum necessary for the intended purpose.</p> <p>Lighting will be directed to where it is needed to minimise upwards light distribution and light spill into the surrounding environment. Reference will be made to the <i>Guidance Notes for the Reduction of Obtrusive Light, GN01:2011</i> (Institute of Lighting Professionals) with regard to angle of fitting and choice of luminaires.</p> <p>Mitigation strategies may also include the use of shields/louvres on fittings, screening via fencing or earthworks/bunds and limiting the hours of operation or reducing the light output through dimming.</p>
Landscape Designations: Lake District National Park	Effects on the statutory purpose of the National Park, its designated special qualities and landscape setting.	Environmental measures to preserve the natural beauty and recreational value of the National Park will include the incorporation of enhanced landscape/architectural design, the provision of

Potential receptor	Predicted changes and potential effects	Incorporated measure
		a landscape masterplan, landscape management and/or off-site measures to reduce effects and ensure the nature of these effects is neutral or positive as far as possible.
Landscape Designations: St. Bees Heritage Coast	Effects on the designated special qualities.	Environmental measures to preserve the natural beauty and recreational value of the National Park will include the incorporation of enhanced landscape/architectural design, the provision of a landscape masterplan, landscape management and/or off-site measures to reduce effects and ensure the nature of these effects is neutral or positive as far as possible.
Landscape Designations: Landscape of County Importance	Effects on the designated special qualities.	Environmental measures to “ <i>protect the areas designated as Landscapes of County Importance from inappropriate change</i> ” in line with Policy DM26 of the Copeland Local Plan 2013-2028. These will include the incorporation of enhanced landscape/architectural design, the provision of a landscape masterplan, landscape management and/or off-site measures to reduce effects and ensure the nature of these effects is neutral or positive as far as possible.
Moorside Site only		
Landscape/Seascape Character (key characteristics) and the special qualities of landscape designations	Introduction of additional large-scale infrastructure alongside that already present within the Sellafield Site.	Whilst the landscape and architectural design of the Moorside Site is on-going, the emerging masterplan indicates the following design principles: Simple linear layout of 3 power blocks (i.e. the reactors of the Moorside Power Station);

Potential receptor	Predicted changes and potential effects	Incorporated measure
		<p>Overlaid with a logical and cohesive grid of roads and related built form;</p> <p>Avoiding ‘visual clutter’;</p> <p>Contained and partly screened by new landform; and</p> <p>Set within simple green landscape of new trees, fields and woodland.</p> <p>As the design progresses further enhanced landscape/architectural design, the provision of a landscape masterplan, landscape management and/or off-site measures to reduce effects and ensure the nature of these effects is neutral or positive as far as possible will be included</p>
	<p>Introduction of large-scale earthworks within the Moorside Site.</p>	<p>Whilst the landscape design of the Moorside Site is on-going, the assessment has considered a candidate Moorside Site design as follows:</p> <p>Large scale earthworks designed to reflect and mimic the local topography and landscape characteristics, whilst maintaining long distant views to the fells cited as a characteristic of sub-type 5b (Low Farmland). Outer slopes (i.e. west, north and some east facing slopes) designed to reflect existing gradients found within the surrounding landscape, whilst inner slopes (facing the development are steepest).</p> <p>By respecting the surrounding landform, the scale and geometry of the development has an emerging hierarchy of built form and landscape</p>

Potential receptor	Predicted changes and potential effects	Incorporated measure
		earthworks that seeks to integrate the development into the landscape.
	Direct or indirect effects on valued characteristics, special qualities and character.	<p>Assessment to consider the viability of the remaining areas of landscape character and whether design measures such as specific or enhanced landscape/architectural design, landscape management or off-site measures may be needed. Such measures could include:</p> <ul style="list-style-type: none"> The retention of existing mature vegetation, reinforced through the creation of a robust landscape framework/green infrastructure network to help integrate the built form and soften its appearance; Opportunities to introduce trees/woodland cover and create new habitats within the site boundary; and The use of building materials, detailing and finishes that respond in a positive way to the new and existing landscape context at Moorside.
Accommodation Sites, Rail Sites, and Other Sites		
Landscape and Townscape Character	Direct or indirect effects on valued characteristics, special qualities and character.	Assessment to consider the viability of the remaining areas of landscape character and public realm quality of townscape areas. To consider whether design measures such as specific or enhanced landscape/urban/architectural design, landscape management or off-site measures may be needed. Such measures could include:

Potential receptor	Predicted changes and potential effects	Incorporated measure
		<p>The retention of existing mature vegetation, reinforced through the creation of a robust landscape framework/green infrastructure network to help integrate the built form and soften its appearance;</p> <p>Opportunities to introduce trees/woodland cover and create new habitats with an emphasis on these being publicly accessible and permanent; and</p> <p>The use of building materials, detailing and finish for the roofs and facades that respond in a positive way to its existing townscape and landscape context at each Site.</p>

Table 23.5 Visual

Potential receptor	Predicted changes and potential effects	Incorporated measure
Common to all sites		
<p>All visual receptors overlapped by the ZTV within 1-2 km and in particular receptors at:</p> <ul style="list-style-type: none"> ▪ Beckermets; ▪ Braystones; ▪ Blackbeck; ▪ Whitehaven; ▪ Egremont; ▪ Thornhill; ▪ Individual residents; ▪ Community locations; ▪ Recreational routes; ▪ Road networks. 	<p>Existing views may be blocked by the imposition of new buildings, earthworks and or landscaping:</p> <ul style="list-style-type: none"> ▪ Complete blocking of view; ▪ Loss of light/over-shadowing; ▪ Light pollution; ▪ Loss of valued views to the Fells or Sea for example; ▪ Loss of residential visual amenity. 	<p>The positioning of these components will require an appropriate ‘set back’ and design of their appearance in order to enhance or satisfactorily maintain an appropriate level of visual amenity for residents and people in their community.</p> <p>The generic types of mitigation the preliminary assessments have assumed to be incorporated into the project design include:</p> <ul style="list-style-type: none"> ▪ Relocation of parts of the proposed development; ▪ Architectural design of buildings; ▪ Landscape design of earthworks, trees, woodland, etc.; ▪ Lighting design and control. <p>The detailed design of such measures will be subject to the ongoing iterative design and assessment process.</p>
<p>All visual receptors overlapped by the ZTV within the study area and in particular receptors at:</p> <ul style="list-style-type: none"> ▪ Beckermets; ▪ Braystones; ▪ Blackbeck; ▪ Whitehaven; ▪ Egremont; ▪ Thornhill; 	<p>Changes to existing views, visual amenity and scenic quality:</p> <ul style="list-style-type: none"> ▪ Introduction of new large scale features to the view; ▪ Creation of a new focal point or feature in the view; ▪ Alteration to the landscape character of the view; 	<p>The generic types of mitigation the preliminary assessments have assumed to be incorporated into the project design include:</p> <ul style="list-style-type: none"> ▪ Relocation of parts of the proposed development; ▪ Architectural design of buildings; ▪ Landscape design of earthworks, trees, woodland, etc.

Potential receptor	Predicted changes and potential effects	Incorporated measure
<ul style="list-style-type: none"> ▪ Individual residents; ▪ Community locations; ▪ Designated landscapes (St Bees Heritage Coast); ▪ Recreational routes; ▪ Road networks. 	<ul style="list-style-type: none"> ▪ Loss of or disruption to existing views of skylines, the fells, the sea or other landmark features; ▪ Changes to perceptions of movement through increased traffic or plumes; and ▪ Reductions in perceived public enjoyment and appreciation of the special qualities of the LDNP. 	<p>The detailed design of such measures will be subject to the ongoing iterative design and assessment process.</p>
<p>All visual receptors overlapped by the ZTV within the study area and in particular receptors at:</p> <ul style="list-style-type: none"> ▪ Beckermat; ▪ Braystones; ▪ Blackbeck; ▪ Whitehaven; ▪ Egremont; ▪ Thornhill; ▪ Individual residents; ▪ Community locations; ▪ Designated landscapes (St Bees Heritage Coast and Lake District National Park); ▪ Recreational routes; ▪ Road networks. 	<p>Changes to the perceptual qualities of views and visual amenity:</p> <ul style="list-style-type: none"> ▪ Change to depth of field, perceptions of openness/enclosure; ▪ Changes to perceptions of tranquillity, naturalness and remoteness; and ▪ Reductions in perceived public enjoyment and appreciation of the special qualities of the LDNP. 	<p>Changes to the perceptual character of the view may be unavoidable, particularly in close range views (for example changing from an open rural landscape to a more enclosed, wooded and/or developed landscape). However, landscape mitigation techniques can be used to retain reasonable levels of tranquillity and naturalness through screening and integrated design.</p> <p>The types of landscape mitigation techniques assumed to be incorporated into the project design during the preliminary assessment are set out in Table 7.2. The detailed design of such measures will be subject to the ongoing iterative design and assessment process.</p>
<p>All visual receptors overlapped by the ZTV within the study area and in particular receptors at:</p> <ul style="list-style-type: none"> ▪ Beckermat; ▪ Braystones; ▪ Blackbeck; ▪ Whitehaven; ▪ Egremont; ▪ Thornhill; 	<p>Visual effects resulting from light pollution.</p>	<p>The following are considered important in the design of a lighting strategy for the proposed development across all sites and will be completed and assessed as part of the ES that accompanies DCO submission:</p> <ul style="list-style-type: none"> ▪ The minimum levels of light required to safely perform the required tasks are to be identified through reference to British

Potential receptor	Predicted changes and potential effects	Incorporated measure
<ul style="list-style-type: none"> ▪ Individual residents; ▪ Community locations; ▪ Designated landscapes (St Bees Heritage Coast and Lake District National Park); ▪ Recreational routes; ▪ Road networks. 		<p>Standards Codes of Practice and other relevant industry guidance. The number of lighting columns to be introduced will be the minimum necessary for the intended purpose.</p> <ul style="list-style-type: none"> ▪ Lighting will be directed to where it is needed to minimise upwards light distribution and light spill into the surrounding environment. Reference will be made to the <i>Guidance Notes for the Reduction of Obtrusive Light, GN01:2011</i> (Institute of Lighting Professionals) with regard to angle of fitting and choice of luminaires. ▪ Mitigation strategies may also include the use of shields/louvres on fittings, screening via fencing or earthworks/bunds and limiting the hours of operation or reducing the light output through dimming. <p>The detailed design of such measures will be subject to the ongoing iterative design and assessment process.</p>
<p>All visual receptors overlapped by the ZTV within the study area and in particular receptors at:</p> <ul style="list-style-type: none"> ▪ Beckermat; ▪ Braystones; ▪ Blackbeck; ▪ Whitehaven; ▪ Egremont; ▪ Thornhill; ▪ Individual residents; 	<p>Visual effects resulting from seasonal changes.</p>	<p>Landscape mitigation such as tree/woodland/hedgerow planting needs to be sufficiently robust and of an appropriate size, scale and species mix to ensure that the mitigation of potentially significant visual effects are not limited only to the summer months for example.</p> <p>Early (or potentially advance) planting programs also need to be considered to ensure that</p>

Potential receptor	Predicted changes and potential effects	Incorporated measure
<ul style="list-style-type: none"> ▪ Community locations; ▪ Recreational routes; ▪ Road networks. 		<p>planting will be established in time to mitigate visual effects as far as possible, during the construction and operation phases.</p> <p>The detailed design of such measures will be subject to the ongoing iterative design and assessment process.</p>
Moorside Site only		
A number of residents within Beckermat.	Loss of existing westerly/south-westerly views of the high fells due to the introduction of the northern landscaping mounds.	<p>Design of the landform to ensure that, whilst some views may be temporarily lost during a part of the construction period, the majority of such views would be reinstated during the operational period.</p> <p>Outline proposals for this measure (e.g. that the maximum height of the northern landscaping mounds does not exceed approximately 68 m AOD) have been included in the assumptions for the preliminary assessment. The detailed design of such measures will be subject to the ongoing iterative design and assessment process.</p>
Receptors using PRoWs and open access land within the Lake District National Park	Introduction of new built development in many south-western/western/north-western views	<p>Layout of principal buildings adopts strong geometric and linear pattern to reduce visual clutter and ensure that the layout is visually comprehensible. Minimisation of potential for built development to extend above the land/sea horizon and the distant horizon in elevated views from Lake District National Park.</p> <p>Design of external and cladding materials in terms of texture, colours and reflectiveness to</p>

Potential receptor	Predicted changes and potential effects	Incorporated measure
		<p>minimise contrast with surrounding landscape context and potential visual intrusiveness.</p> <p>The detailed design of such measures will be subject to the ongoing iterative design and assessment process.</p>
<p>Receptors using PRoWs and open access land within the Lake District National Park</p>	<p>Introduction of new landforms, primarily the northern landscaping mounds in many south-western/western/north-western views.</p>	<p>Design of northern (and southern) landscaping mounds to ensure that they do not intrude above the land/seas horizon in elevated views from Lake District National Park.</p> <p>Implementation of early landscaping programme on middle and lower slopes to ensure that landcover pattern on these slopes is established as soon as possible during construction period to reduce the potential intrusive role of the mounds in elevated views from Lake District National Park.</p> <p>Implementation of re-profiling and landscaping programme on upper parts the mounds as soon as their use as laydown and assembly areas allows. Facilitation of rapid establishment of land-cover and field boundary pattern appropriate to visually integrate the mounds with surrounding landscape character context.</p> <p>The detailed design of such measures will be subject to the ongoing iterative design and assessment process.</p>

Table 23.6 Countryside Access and Recreation

Potential receptor	Predicted changes and potential effects	Incorporated measure
Common to all sites		
Users of public rights of way	Potential for these ways to be closed due to construction and/or operational requirements. This would lead to loss of access for users and reduced amenity value.	Provisional routes for diversions have been identified and agreed with stakeholders who attended workshop on 8 April 2016.
Users of permissive paths	Potential for any of these routes to be closed due to construction and/or operational developments. This would lead to loss of access for users.	For all routes of sufficient importance (i.e. the Sustrans routes 71/72) diversions or alternatives will be provided and provisional routes for diversions have been identified and agreed with stakeholders who attended workshop on 8 April.
Users of all routes and access areas	Risks to users from construction activity.	Appropriate signage and the use of banksmen will be provided as appropriate. Full details will be contained within the CEMP which accompanies the ES.
Moorside Site only (to be read in conjunction with Figures 9.11 and 9.12)		
Users of the existing coastal footpath (to become the England Coastal Path National Trail)	Development will require the existing route to be closed during construction.	An alternative route will be provided during construction, which will form part of the DCO application. During operation, the ECPNT is expected to be reinstated. Details of these diversions are shown in Figures 9.11 and 9.12.
Users of Sustrans Route 72	Development will require the existing route to be closed permanently.	An alternative route will be provided, which will form part of the DCO application. Details of these diversions are shown in Figures 9.11 and 9.12.

Potential receptor	Predicted changes and potential effects	Incorporated measure
Recreational users of Common Land	The proposals will require part of the existing Common Land to be developed, resulting in loss.	Replacement Common Land will be provided as necessary and will form part of the DCO application. Figure 9.2 provides an area of search within which replacement land will be sought, based on information available at this point in time.
Users of foreshore	Public access to sections of the foreshore will be lost during construction and a smaller area during operation.	Access would be provided to the limit of the fenced area, with access to the south of the MOLF facilitated by a new footbridge. During operation, access to the foreshore would be reinstated except to a small area needed for the MOLF.
Anglers wanting to fish in lower reaches of the River Ehen	Public access to sections of the river will be lost during construction.	Access would be provided to limit of fenced area, with access to the south of the MOLF facilitated by a new footbridge. During operation, access to the river where it passes under the MOLF would be reinstated.
Users of public footpaths	Most public footpaths will not be affected. However, some will need to be diverted and one public footpath (MS05) will be lost to the development.	Alternative routes will be provided as appropriate, which will form part of the DCO application. Details of these footpath diversions are shown in Figure 9.11 and 9.12). Discussions will be held with local residents to develop ideas for a suitable replacement (possible involving a section of the dismantled railway). In addition, appropriate improvements will be made (e.g. gates will replace stiles) to other public rights of way, many of which are difficult to use at present, so that there should be a net gain in length of way available for the public to use.

Potential receptor	Predicted changes and potential effects	Incorporated measure
Corkickle Site only (to be read in conjunction with Figure 9.13)		
Sustrans Route 71/72	Construction traffic may impact on availability of the route or pose risks to users.	Management measures (e.g. banksmen) will be used to ensure route remains available during construction. The ambience of the route could be enhanced by removal of metal palisade fencing.
Open Areas	The proposals will require this land to be developed.	The masterplans for the site include a linear park and other green infrastructure to provide access to better quality open spaces.
Mirehouse Site (to be read in conjunction with Figure 9.14 and 9.15)		
Sustrans Route 71/72 including Westlakes Link	Construction traffic may impact on availability of the route or pose risks to users. Character and attractiveness of route may change adversely.	Management measures (e.g. banksmen) will be used to ensure route remains available during construction. Bridges will be built so that the route remains 'at grade' through the site. Westlakes Link will be re-routed to join and follow the new access road.
Open Areas	These areas lie outside the red line boundary but may be affected by disturbance e.g. dust, noise, increased traffic, change of character.	Mitigation measures to be set out in the CEMP which will accompany the ES will reduce the impact.
Mirehouse Pond and path	These features lie outside the red line boundary but may be affected by disturbance e.g. dust, noise, increased traffic, change of character.	Mitigation measures to be set out in the CEMP which will accompany the ES will reduce the impact.
Egremont Site (to be read in conjunction with Figure 9.16)		
Sustrans Route 72	Access to the site for construction traffic crosses the Sustrans Route.	A shift in the Sustrans route crossing point, with appropriate signage.

Potential receptor	Predicted changes and potential effects	Incorporated measure
Additional Sites		
Users of Sustrans Routes 71/72 (Corkickle to Mirehouse Railway Site; A595/Moor Row Improvement Site)	Construction work could interfere with continued use of the routes.	Construction methods designed to ensure routes remain open (particularly where they pass under bridges).
Users of Coast to Coast Walk (A595/Moor Row Improvement Site)	Construction work could interfere with access between this route and A595.	Construction methods designed to ensure route remains open.
Users of bridleways (on each side of the A595/Homewood Road Roundabout Improvement Site)	Construction work could interfere with continued use of the bridleways.	Construction methods designed to ensure routes remain open.
Users of private track (St Bees Railway Site)	Construction work could interfere with continued use of the track.	Mitigation measures to be set out in the CEMP which will accompany the ES will reduce the impact on public users.
Users of Curwen Park (A596 Hall Brow Improvement Site)	Current access point from A66 may be affected during construction.	Temporary replacement access to park provided if needed.

Table 23.7 Socio-economics and human population

Potential receptor	Predicted changes and potential effects	Incorporated measure
Common to all sites		
<p>The size, diversity and prosperity of the local economies of Copeland, Allerdale and Cumbria</p>	<p>The scope for local businesses to pursue and realise supply chain opportunities is likely to be constrained in the absence of proactive measures on the part of NuGen and local stakeholders to raise awareness and capacity.</p> <p>Seeking to increase local sourcing has the benefit of retaining the associated economic benefits of construction and operation locally, as well as reducing the distance that goods are transported to the Moorside Site.</p> <p>There is also an expectation in national policy that developers and operators of new nuclear power stations will put in place reasonable measures to assist with maximising the economic benefits locally and nationally.</p>	<p>NuGen is committed to seeking to maximise the use of UK and Cumbria based businesses in the supply chain for the project and will source locally wherever possible. It will work with local authorities and economic development and sector bodies to develop an understanding of the capabilities of the local area, and to develop a database of local firms who could potentially play a part in the supply chain. This will form the evidence base for a supply chain strategy. The majority of opportunities are likely to be in lower tiers of the supply chain. The Supply Chain Strategy will therefore focus on enabling them to make links with upper tier contractors, and encourage contractors to make use of local suppliers wherever possible.</p>
<p>People in employment or seeking employment within Cumbria</p>	<p>The scope for local workers (both currently in the workforce and likely to enter in future years) to pursue and secure employment opportunities in the construction of the Moorside Site, as well as its operation, is likely to be constrained in the absence of proactive measures on the part of NuGen and local stakeholders to raise awareness of the opportunities, to develop skills and improve work readiness.</p> <p>Seeking to increase the use of local workers in construction and operation of the Moorside Project (and the associated supply chains) has the benefit of retaining the associated economic</p>	<p>NuGen is committed to seeking to maximise local economic benefits to West Cumbria and will work with partners to develop a Workforce Development Strategy which maximises the number of local people accessing employment during the construction and operational phase. This will be based on an analysis of the workforce requirements of the project, and an assessment of the capacity and skills of the current and future population of West Cumbria. It will also consider the potential barriers potential workers face which may prevent them from accessing employment at Moorside. Based</p>

Potential receptor	Predicted changes and potential effects	Incorporated measure
	<p>benefits of construction and operation locally, as well as improving the long term supply of skills and productivity in the local economy.</p> <p>There is also an expectation in national policy that developers and operators of new nuclear power stations will put in place reasonable measures to assist with maximising the economic benefits locally and nationally including workforce measures.</p>	<p>on this evidence, it will make recommendations for the types of interventions required. These will be defined in the strategy but could include employment brokerage services, outreach activities, working with local providers to deliver apprenticeship schemes and capital investment in new facilities.</p>
<p>Users of social and community infrastructure in Copeland and Allerdale</p>	<p>An influx of workers could increase pressure on existing health services and reduce the quality of care available to existing communities.</p>	<p>NuGen will appoint a specialist provider of occupational healthcare services to the workforce during the construction phase, which will minimise pressures placed on local NHS services. The specific services have not been defined in detail but are likely to include the following types of measures:</p> <p>Prevention: measures which promote safe working practices to minimise the number of accidents (likely to include risk assessments and risk registers, pre-employment health screening to determine fitness to work, development of a health and safety plan, development of a drugs and alcohol policy)</p> <p>Promotion: measures to maintain and improve the health and wellbeing of the workforce through raising awareness of work and lifestyle related health issues (to include campaigns and advice on smoking, diet, alcohol and stress).</p> <p>Intervention: treatment and advice services to employees who have accidents or are taken ill at work, as well as emergency response teams</p>

Potential receptor	Predicted changes and potential effects	Incorporated measure
		(medically qualified individuals who can rapidly respond and stabilise staff involved in incidents, as well as facilitating ambulances to take staff to hospital if required). While it will still be necessary to make some referrals to GPs and emergency visits to hospitals, these services are likely to minimise pressures on local NHS facilities.
Users of social and community infrastructure in Copeland and Allerdale	An influx of workers could increase pressure on existing sports and recreation services and reduce the quality of care available to existing communities.	NuGen will ensure that a range of services are provided within the worker accommodation campuses, including sports and leisure facilities. Some of these will be made accessible to the public
Users of social and community infrastructure in Copeland and Allerdale	An influx of workers could increase pressure on places of worship	NuGen will ensure that a range of services are provided within the worker accommodation campuses, including prayer rooms.
Residents of Allerdale and Copeland who could be affected by changes in the vitality of communities	An influx of workers could increase rates of crime or increase the fear of crime among existing communities	NuGen will work with the Cumbria Constabulary to develop a Community Safety Management Plan. This would identify the potential risks to community safety (including residents and workers) and would implement appropriate measures which minimise the risk of crime or anti-social behaviour. These could include measures such as a worker code of conduct, a welcome pack and formal induction process for incoming workers, a strict alcohol and drugs policy, and an agreement on information sharing and working arrangements with the Cumbria Constabulary.

Table 23.8 Soils, Geology and Land Quality

Potential receptor	Predicted changes and potential effects	Incorporated measure
Common to all sites		
Human Health (Construction workers, adjacent site users and potential trespassers during construction works).	Health effects from exposure to contaminated soils and groundwater during excavation of potential contaminated material.	Detailed prior intrusive investigation and assessment of land quality; remediation of the sites as necessary; use of appropriate PPE/ safe working systems/ good hygiene practices; use of good environmental construction practice, e.g. materials management, dust control, bunding of fuel/ chemical storage etc. The site will also be securely fenced to deter unauthorised access.
Human Health (Construction workers, adjacent site users and potential trespassers during construction works).	Health effects from exposure to dangerous levels of mine (and ground) gases, especially if working within confined spaces.	Detailed prior investigation and assessment of gas risks and the implementation of safe working systems during works to ensure gas levels are monitored in at-risk locations. Use of warning signage and measures to restrict unauthorised access to at-risk areas, including confined spaces. The site will also be securely fenced to deter unauthorised access.
Human Health (future site users, adjacent site users - operational phase).	Health effects from exposure to potential contaminated soils and groundwater.	Detailed prior intrusive investigation and assessment of land quality (carried out at the construction phase); remediation of the sites as necessary; good materials management during construction to prevent inadvertent replacement of unsuitable materials on site; incorporation of design/ construction mitigation measures as required (e.g. gas protection measures, clean cover systems, appropriate material specification water pipes etc.) Pollution prevention infrastructure and environmental management systems as required by Environmental Permit.
Property (built environment).	Damage, deterioration, degradation of built environment due to exposure to potential contaminated soils.	Detailed prior intrusive investigation and assessment of land quality; remediation of the sites as necessary; good materials management during construction to prevent inadvertent replacement of unsuitable materials on site; incorporation of

Potential receptor	Predicted changes and potential effects	Incorporated measure
		design/ construction mitigation measures as required. Pollution prevention infrastructure and environmental management systems as required by Environmental Permit.
Property (crops, livestock, wild and domestic animals).	Health effects, reduced yield from exposure to potential contaminated soils.	Detailed prior intrusive investigation and assessment of land quality; remediation of the sites as necessary; good materials management during construction to prevent inadvertent replacement of unsuitable materials on site; incorporation of design/ construction mitigation measures as required. Pollution prevention infrastructure and environmental management systems as required by Environmental Permit.
Soil environment.	Impairment, reduction in quality and functionality of soil due to potential contamination.	Detailed prior instructive investigation and assessment of land quality; remediation of the sites as necessary; good materials management during construction to prevent inadvertent replacement of unsuitable materials on site; incorporation of design/ construction mitigation measures as required. Pollution prevention infrastructure and environmental management systems as required by Environmental Permit.
Soil environment.	Damage/ degradation of sub and topsoils during stripping, excavation, handling, stockpiling and replacement etc. (e.g. compaction/ consolidation)	Conduct detailed intrusive/ site specific ALC/ soil resource surveys to characterise and assess soil resource. Careful pre planning and phasing of works to minimise stockpiling of soils where possible. Carry out construction works in accordance with a detailed Soil Management Plan and upkeep of a Site Condition Report. Rehabilitate soils recovered from storage by adoption of best practice (e.g. Construction Code of Practice for the Sustainable Use of Soil on Construction Sites).
Agricultural Land	Permanent and/ or temporary loss of agricultural land as a result of the development.	The examination of ways to avoid and/or minimise permanent loss of BMV land e.g. through re-design and planning of proposed development; rehabilitating areas where possible; and potentially undertaking, for example, works to improve poor quality

Potential receptor	Predicted changes and potential effects	Incorporated measure
		agricultural land within the offsetting areas by the placement of surplus soils and potentially the provision of other land enhancement techniques including improved drainage provision.
Geological features of Interest.	Damage, destruction, and/or loss of access to geological features of interest as a result of the construction works.	Confirmation of features of interest and design/ planning of proposed development to prevent damage, destruction or loss of feature.

Table 23.9 Historic Environment

Potential receptor	Predicted changes and potential effects	Incorporated measure
Common to all sites		
Areas and deposits of archaeological interest within the development footprint.	The loss of deposits of archaeological interest is likely to result from development activities involving ground disturbance during the construction phase.	Where the loss of or disturbance of deposits of archaeological interest cannot be avoided, then these will be excavated and recorded in advance of development.
Earthworks including field boundary banks and other historic landscape features within the development footprint.	The loss of historic field boundary banks and other earthworks is likely to result from development activities involving ground disturbance during the construction phase.	Where the loss of these cannot be avoided, then these will be recorded in advance of development.
Moorside Site only		
St Bridget's Church Grade II* listed building (LB 1086588) and Two High Cross Shafts scheduled monument (SM 1012644).	Harm to heritage significance during construction and operational periods as result of construction activities and then subsequently the presence of site infrastructure resulting in an adverse effect on setting.	Design of landscaping mounds to limit effects so far as possible and potential for early establishment of mound and planting to screen assets during construction period.
Non-listed historic farm buildings including Mid Tarn Farm, Tarn Head Farm and Brig-Dyke Farm.	Loss of heritage assets as a result of demolition.	Historic buildings will be subject to detailed recording in advance of demolition. This will comprise a written, drawn and photographic record of up to Level 4 (English Heritage 2006 Understanding Historic Buildings: A guide to good recording practice).
Offshore deposits of archaeological interest.	Direct disturbance to deposits as a result of construction and due to scour around infrastructure.	As noted in Chapter 15, Marine and coastal physical processes , the MOLF will be a piled structure and this will limit disturbance during construction due to scour in comparison to an enclosed structure.

Potential receptor	Predicted changes and potential effects	Incorporated measure
Corkickle Site only		
Non-listed historic industrial buildings and structures within the development footprint.	Loss of heritage assets as a result of demolition.	Retention of historic structures within the scheme layout where possible. This may not be possible for all building or structures within the development footprint but it is likely to be achievable for individual structures or elements of the current site layout which provide a reference to the industrial past of the Corkickle Site. Historic buildings will be subject to detailed recording in advance of demolition. This will comprise a written, drawn and photographic record of up to Level 4 (English Heritage 2006 Understanding Historic Buildings: A guide to good recording practice).
Archaeological remains associated with former industrial and mining activity.	The loss of deposits of archaeological interest is likely to result from development activities involving ground disturbance during the construction phase.	Where the loss of or disturbance of deposits of archaeological interest cannot be avoided, then these will be recorded in advance of development.
Mirehouse Site only		
Archaeological remains associated with former industrial and mining activity.	The loss of deposits of archaeological interest is likely to result from development activities involving ground disturbance during the construction phase.	Where the loss of or disturbance of deposits of archaeological interest cannot be avoided, then these will be recorded in advance of development.

Table 23.10 Freshwater environment: groundwater

Potential receptor	Predicted changes and potential effects	Incorporated measure
Common to all sites		
All receptors	Altered recharge regime due to the proposed changes in topography and land use.	Adoption of best practice site measures e.g. deployment of sustainable drainage systems.
	Soil disturbance, spoil leakage and chemical and fuel spillages and leakages leading to groundwater pollution.	Adoption of best practice site measures e.g. CEMP, EA PPGs, upkeep of a Site Condition Report.
Moorside Site only		
All relevant receptors	Groundwater dewatering leading to a reduction in groundwater levels, flow and quality; other changes in the groundwater flow regime caused by the placement of permanent sub-water table structures. Also consequential migration of any pre-existing contamination.	Excavation/shaft/tunnel lining, cut-off wall(s) and drainage corridors; groundwater reinjection and/or surface flow augmentation, regular monitoring.

Table 23.11 Freshwater environment: surface water

Potential receptor	Predicted changes and potential effects	Incorporated measure
Moorside Site only		
Aquatic environment - Ehen (lower) WFD water body GB112074069980 (water quality)	During the construction and operational phases of the Moorside Site there could be increased concentrations of pollutants such as ammonia and phosphates released into the River Ehen from sewage discharges (should these occur).	Environmental Permits for all relevant water discharges would be sought. Permits for treated sewage effluent discharge would impose conditions on the quality of effluent discharge in order to protect receiving water quality. The use of existing infrastructure at Braystones Wastewater Treatment Works (which discharges to sea) would avoid any effects on the River Ehen.
Aquatic environment - Ehen (lower) WFD water body GB112074069980 (water quality and quantity)	The construction and operational phases of the Moorside Site could result in an impact on water quality and quantity in the River Ehen through a potential increase in surface water runoff and dewatering activities. Runoff from areas disturbed by construction could be laden with high concentrations of suspended sediments. Uncontrolled runoff and dewatering discharges from the site could lead to deterioration in the water quality status of the Ehen.	The creation of swales, settlement ponds and other related drainage techniques within the Moorside Site should prevent pollutants from entering the watercourses. Climate change impacts over the lifetime of the development would be factored into the design of permanent drainage infrastructure. It is likely that surface water runoff from the power station site would be discharged directly to sea, in the latter stages of construction and during the operational phase of the Project.
Aquatic environment - Ehen (lower) WFD water body GB112074069980 (hydromorphology)	The construction and operation of the bridge crossing the River Ehen could lead to local changes in in-channel morphology, with subsequent implications for riverine habitat availability.	The detailed bridge design process will seek to avoid any impacts on the channel and immediate riparian corridor. If this cannot be avoided, measures would be taken to ensure that alterations to in-channel morphology, and associated bed/bank reinforcement would not have an adverse effect on the overall status of

Potential receptor	Predicted changes and potential effects	Incorporated measure
		WFD water body. The final bridge design would be subject to agreement with the EA via the Environmental Permitting for flood risk activities process.
Aquatic environment - Calder (lower) WFD water body GB112074069730 (water quality)	The Moorside Site includes interim laydown areas and landscaping mounds within the catchment of this waterbody. The construction and operational phases could result in an increase in sediments and other pollutants being discharged into the River Calder upstream of the Sellafield site.	The creation of swales, settlement ponds and other related drainage control techniques within the Moorside Site should prevent pollutants from entering the River Calder. Climate change impacts over the lifetime of the development would be factored into the design of permanent drainage infrastructure.
Aquatic environment - Kirk Beck (Ehen) WFD water body GB112074069970 (water quality)	Some construction activities on the Moorside Site (i.e. the creation of the landscaping mound in the northern area of the site) could lead to water quality effects in this water body arising from surface water runoff from the site and potential dewatering activities.	The creation of swales, settlement ponds and other related drainage techniques on the Moorside Site should prevent pollutants from entering this surface water body. Climate change impacts over the lifetime of the development would be factored into the design of permanent drainage infrastructure.

Table 23.12 Marine and Coastal Physical Processes

Potential receptor	Predicted changes and potential effects	Incorporated mitigation
Moorside Site only		
<p>Designated morphological features within the Cumbria Coast MCZ</p> <p>Designated morphological features within the Drigg Coast SAC</p> <p>Hydromorphological elements of Cumbria Coast Water Body and Esk Transitional Water Body</p> <p>The coastline and associated infrastructure</p>	<p>Localised interruption of sediment transport and patterns of nearshore/inshore wave propagation, potentially leading to morphological change at the coast and at the seabed.</p>	<p>It is envisaged that the inclusion of a piled jetty within the MOLF will greatly reduce the direct blockage of sediment transport in comparison to an enclosed structure. The extent of wave refraction and diffraction will also be much less, lessening any changes to the rate/direction of sediment transport.</p> <p>Intake and outfall tunnels will be beneath the seabed surface. This will remove the potential for interaction with waves and associated sediment transport processes.</p>

Table 23.13 Marine Water and Sediment Quality

Potential receptor	Predicted changes and potential effects	Incorporated measure
Moorside Site only		
Cumbria coastal waterbody including WFD protected areas (Drigg Coast SAC and St Bees and Seascale Bathing Beaches).	Activities undertaken during the construction phase (e.g. excavations and land forming) could result in an increase in the amount of sediment (potentially contaminated) discharged into the marine environment from surface water runoff.	The use of swales, settlement ponds and other related drainage techniques will be used during construction to prevent excess sediments from entering the marine environment.
	During the construction and operational phases of the project there could be accidental spillages and leaks of pollutants into the marine environment (including sewage from temporary facilities, sediment from surface water runoff and hydrocarbons from surface water runoff).	The use of settlement ponds, oil interception and other related drainage control techniques within the Moorside Site will prevent sediments and heavy metals from entering the marine environment. Measures set out in the finalised CEMP as described in the ES will reduce potential adverse effects upon the marine environment.
	There could be increased concentrations of pollutants such as ammonia, nutrients and enteric bacteria which could occur in the marine environment from increases in treated sewage discharges. The discharges could occur during the construction and operational phases of the project, from new sewage treatment plant(s) or effluent increases routed to existing infrastructure e.g. Braystones wastewater treatment works which currently treats sewage from all the local public sewers around the Moorside Site and discharges direct to sea.	Standard treatment options at current or new onsite wastewater treatment works will protect marine water and sediment quality. See Section 16.6.2 . Where necessary and feasible ultraviolet treatment may be used on the treated sewage effluent to protect bathing beaches.

Potential receptor	Predicted changes and potential effects	Incorporated measure
	The operational phase of the project will involve discharges of process chemicals used in the power station and potentially discharges of disinfectants and their by-products arising from use of chemicals to keep the cooling water intake/outfall clear of marine fouling growth.	Standard treatment options at current or new onsite wastewater treatment works will protect marine water and sediment quality. See Section 16.6.2 for more information.
	The operational phase of the project will involve discharge of cooling water at a temperature above ambient, providing an input of heat to the marine environment and a zone of increased water temperature (thermal plume).	The outfall is being designed to maximise effective diffusion of the thermal plume. See Section 16.6.2 for more information.
	The operational phase of the project could result in an impact on water quality due to discharges of sediments settled out from the cooling water intake flows.	The outfall is being designed, placed and operated in a way to minimise any impacts on water quality. This may also include the removal of sediments by filtering or mechanically from the forebay area prior to discharge. See Section 16.6.2 for more information.
Egremont Site		
Cumbria coastal waterbody including WFD protected areas (including St Bees and Seascale Bathing Beaches).	There is the possibility of increased concentrations of pollutants such as ammonia, nutrients and enteric bacteria which could occur in the marine environment from increases in discharges of treated sewage effluent. The discharges could occur during the construction and operational phases of the project, from new sewage treatment plant(s) or effluent increases routed to existing infrastructure e.g. Braystones wastewater treatment works which currently treats sewage from all the local public sewers	Standard treatment options at current or new onsite wastewater treatment works will protect marine water and sediment quality. See Section 16.6.2 . Where necessary and feasible ultraviolet treatment may be used on the treated sewage effluent to protect bathing beaches.

Potential receptor	Predicted changes and potential effects	Incorporated measure
	around the Moorside Site and discharges direct to sea.	
	During the construction and operational phases of the project there could be accidental spillages and leaks of pollutants into the marine environment (including sewage from temporary facilities).	Measures set out in the final CEMP and as described in the ES will reduce adverse effects to the marine environment.
Corkickle Site		
Solway Outer South coastal waterbody	During the construction and operational phases of the project there could be accidental spillages and leaks of pollutants into the marine environment (including sewage from temporary facilities).	Measures set out in the final CEMP and as described in the ES will reduce potential adverse effects to the marine environment.
	There could be increased concentrations of pollutants such as ammonia, nutrients and enteric bacteria which could occur in the marine environment from discharges of treated sewage effluent. The discharges could occur during the construction and operational phases of the project, from new sewage treatment plant(s) to the Pow Beck or effluent increased routed to existing infrastructure e.g. Whitehaven (Parton) wastewater treatment works which discharges directly to sea.	Standard treatment options at current or new onsite wastewater treatment works will protect marine water and sediment quality. See Section 16.6.2.
	During the construction and operational phases of the project there could be accidental spillages and leaks of pollutants into the marine environment (including sewage from temporary facilities or pumping stations).	During construction, measures set out in the CEMP will reduce adverse effects to the marine environment. During operation, standard measures and appropriate design of wastewater

Potential receptor	Predicted changes and potential effects	Incorporated measure
		infrastructure will reduce adverse effects to the marine environment.
Mirehouse Site		
Solway Outer South coastal waterbody	Depending on the treatment option used there could be increased concentrations of pollutants such as ammonia, nutrients and enteric bacteria which could occur in the marine environment from discharges of treated sewage effluent. The discharge could occur during the operational phase of the project, from routing the sewage to existing infrastructure e.g. Whitehaven (Parton) wastewater treatment works which discharges direct to sea.	Standard treatment options at current or new onsite wastewater treatment works will reduce adverse effects to marine water and sediment quality. See Section 16.6.2.
Cumbria coastal WFD water body	Depending on the treatment option used there could be increased concentrations of pollutants such as ammonia, nutrients and enteric bacteria which could occur in the marine environment from discharges of treated sewage effluent. The discharges could occur during the operational phase of the project from a new sewage treatment plant(s) discharging the Pow Beck (SW lakes).	Standard treatment options at current or new onsite wastewater treatment works will reduce adverse effects to marine water and sediment quality. See Section 16.6.2.

Table 23.14 Marine Ecology

Potential receptor	Predicted changes and potential effects	Incorporated measure
Moorside Site only		
Allonby Bay MCZ West of Walney MCZ Mudhole rMCZ Drigg Coast SAC Solway Firth SAC (see Figures 17.1 and 17.2).	Indirect disturbance to habitats and species within these protected areas from changes in sediment transport and seabed topography arising as a result of the presence of the MOLF, breakwater, and CWS intake and outfall infrastructure.	Siting and design of MOLF, breakwaters, intake and outfall structures to limit, as far as reasonably possible, changes to seabed topography and sediment transport regimes. It is envisaged that the MOLF will be a piled structure which will minimise direct blockage of sediment transport.
	Potential indirect adverse effects from heat and chemical substances discharged via the CWS outfall during operation of the Moorside Power Station (including biocides and oxygen scavengers).	Use of chemicals during operation of the Moorside Power Station will comply with best available techniques (BAT) to ensure that chemical use is appropriate and controlled and that the mitigation which is inherent to the generic design of the AP1000 reactor and included in the Generic Design Assessment (GDA) is applied. Discharge quality will be regulated through conditions established by the environmental permit to ensure that adverse environmental effects are avoided. Appropriate siting and design of CWS outfall to provide adequate dispersion and dilution of thermal/chemical plumes combined with pre-treatment of effluent streams where necessary will ensure protection of the marine environment.
Cumbria Coast MCZ (see Figures 17.1 and 17.2).	Direct removal of sensitive habitat as a result of the construction of the MOLF and breakwater.	Careful siting of the MOLF (and breakwaters) to avoid sensitive habitat such as the honeycomb worm reef (as far as practicable).

Potential receptor	Predicted changes and potential effects	Incorporated measure
		<p>The tunnels for the CWS intake and outfall will be constructed using Tunnel Boring Machines (TBM), starting from above Mean High Water and tunnelling under the MCZ.</p>
	<p>Potential adverse effects from mobilisation of sediments and spills from vehicles, vessels and machinery during construction of the MOLF, breakwater and CWS intake and outfall.</p>	<p>Implementation of standard construction management best practice techniques (which will be outlined in the CEMP).</p>
	<p>Disturbance to habitats and species within this protected area from changes in sediment transport and seabed topography arising as a result of the construction and operation of the MOLF, breakwater and CWS intake and outfall structures.</p>	<p>Siting and design of MOLF, breakwaters, intake and outfall structures to limit changes to seabed topography and sediment transport regimes. It is envisaged that the MOLF will be a piled structure which will minimise direct blockage of sediment transport.</p>
	<p>Potential adverse effects from heat and chemical substances discharged via the CWS outfall during operation of the Moorside Power Station (including biocides and oxygen scavengers).</p>	<p>Use of chemicals during operation of the Moorside Power Station will comply with best available techniques (BAT) to ensure that chemical use is appropriate and controlled and that the mitigation which is inherent to the generic design of the AP1000 and included in the GDA is applied. Discharge quality will be regulated through conditions established by the environmental permit to ensure that adverse environmental effects are avoided.</p> <p>Appropriate siting and design of CWS outfall to provide adequate dispersion and dilution of thermal/chemical plumes, combined with pre-treatment of effluent streams if necessary, will ensure protection of the marine environment.</p>

Potential receptor	Predicted changes and potential effects	Incorporated measure
Plankton	Adverse effects, such as an increase in phytoplankton blooms, due to changes in water temperature and water quality as a result of the thermal/chemical plume from the operation of the CWS, discharge of process chemicals and discharge of treated sewage.	Use of chemicals during operation of the Moorside Power Station will comply with best available techniques (BAT) to ensure that chemical use is appropriate and controlled and that the mitigation which is inherent to the generic design of the AP1000 and included in the GDA is applied. Discharge quality will be regulated through conditions established by the environmental permit to ensure that adverse environmental effects are avoided. Appropriate siting and design of CWS outfall to provide adequate dispersion and dilution of thermal/chemical plumes, combined with pre-treatment of effluent streams if necessary, will ensure protection of the marine environment.
Intertidal/subtidal habitats.	Direct removal of habitat as a result of construction of the MOLF, breakwater and CWS intake and outfall.	Siting and design of MOLF, breakwaters, intake and outfall structures to limit loss of sensitive/valued habitats, as far as practicable, combined with habitat enhancement (where practicable).
	Potential adverse effects from mobilisation of sediments and spills from vehicles and machinery during construction of the MOLF, breakwater and CWS intake and outfall.	Implementation of standard construction management best practice techniques (which will be outlined in the CEMP).
	Disturbance to habitats from changes in sediment transport and scour arising as a result of the construction and operation of the MOLF, breakwater and CWS infrastructure. If included, there is the potential for an increase in sedimentation, and therefore smothering, of	Siting and design of MOLF, breakwaters, intake and outfall structures to limit changes to seabed topography and sediment transport regimes. It is envisaged that the MOLF will be a piled structure which will minimise direct blockage of sediment transport.

Potential receptor	Predicted changes and potential effects	Incorporated measure
	habitats due to the presence of the breakwater creating a “shadow”. This will cause a decrease in water velocity that could cause the finer suspended sediments to settle out of the water column.	
	Potential adverse effects from heat and chemical substances discharged via the CWS outfall during operation of the Moorside Power Station (including biocides and oxygen scavengers).	Use of chemicals during operation of the Moorside Power Station will comply with best available techniques (BAT) to ensure that chemical use is appropriate and controlled and that the mitigation which is inherent to the generic design of the AP1000 and included in the GDA is applied. Discharge quality will be regulated through conditions established by the environmental permit to ensure that adverse environmental effects are avoided. Appropriate siting and design of CWS outfall to provide adequate dispersion and dilution of thermal/chemical plumes, combined with pre-treatment of effluent streams if necessary, will ensure protection of the marine environment.
Fish and ichthyoplankton.	Impingement, entrainment and entrapment of fish and other marine species during the abstraction of water for the CWS.	Design of the intake to minimise entrainment, provision of a fish deterrence system at the intake and provision of a system to collect and return fish (Fish Recovery and Return (FRR) system) and other fauna to the marine environment.
Fish and benthic invertebrates.	Adverse effects, such as startle response and avoidance of area, from noise and vibration during construction of the MOLF, breakwater and CWS infrastructure.	If possible, avoid construction at key periods of spawning and migration.

Potential receptor	Predicted changes and potential effects	Incorporated measure
Migratory fish.	Barrier effect from thermal/chemical plume preventing migration up river.	Appropriate siting and design of CWS outfall to provide adequate dispersion and dilution of thermal/chemical plumes, combined with pre-treatment of effluent streams if necessary, will ensure minimisation of any barrier effect.
	Barrier effect from noise generated through piling activities.	Measures to reduce the impact from piling noise on migratory fish can include the following: changing the timing of the construction to minimise disruption to migration; limiting the amount of noise generated in a given length of time; use of devices such as bubble curtains to reduce the propagation of noise; choose a piling method that limits the amount of noise produced (if possible); and altering the piling method to reduce noise emissions such as using caps (if possible). All measures will be detailed in the CEMP.
	Barrier effect from lighting on the MOLF and during construction of MOLF	Changes in artificial light intensity and duration to minimise any barrier effects. All measures will be detailed in the CEMP.
Marine mammals.	Increased levels of underwater noise during construction of MOLF, breakwater and CWS resulting in direct disturbance or harm and changes to prey distribution.	Where significant levels of underwater noise are expected to be generated, a dedicated Marine Mammal Observer (MMO) to be present on construction vessels. Under UK guidelines ⁴ , the MMO can advise start-up delay if marine mammals are present within a certain distance of the sound source for piling operations (the exact distance will be determined based on the type of piling carried out and therefore noise propagation and marine mammals present). If

Potential receptor	Predicted changes and potential effects	Incorporated measure
		percussive piling is required, then a soft-start technique will be employed. Should it be determined that piling will have the potential to disturb marine mammals, an EPS licence ² will be sought.

² European Protected Species (EPS). Licence application may be made through the UK Government website: www.gov.uk/government/publications/european-protected-species-apply-for-a-mitigation-licence

Table 23.15 Terrestrial and freshwater ecology

Potential receptor	Predicted changes and potential effects	Incorporated measure
Common to all Moorside Project Sites (Moorside Site, Accommodation Sites, Corkickle to Mirehouse Railway Site, the St Bees Railway Site and four of the Highway Improvement Sites (A595/A5094 Inkerman Terrace/B5295 Ribton Moorside Improvement Site, the A66 Ramsay Brow Improvement Site, the A596 Hall Brow Improvement Site and the A595 Parton Junctions Improvement Site)		
Designated sites; watercourses; habitats of Principal Importance for biodiversity conservation; and Cumbria BAP habitats	On-site and off-site habitat degradation due to pollution/ contamination during construction.	The CEMP will incorporate good practice pollution prevention measures; silt control, drainage management and damping of particulates.
	On-site and off-site habitat damage during construction.	The CEMP will require clear demarcation/ separation of exclusion zones/ buffers around designated sites and watercourses and other habitats to be retained.
	On-site and off-site habitat degradation due to air quality effects of operational plant, during both construction and operational phases.	The CEMP will include the requirement for use of plant and vehicles with stringent exhaust emission controls.
	Land-take and associated Habitat Loss.	Where required, a habitat creation scheme in non-operational areas, informed by Defra’s guidance on pilot biodiversity offsetting ³ . Subsequent management of habitats for the life of the Moorside Project to be set out in the HMP.
Badgers	Disturbance or harm of badgers during construction.	Setts and exclusion zones/ buffers mapped as part of an ecological constraints plan to accompany the CEMP and, where possible, disturbance avoided. Where this is unavoidable, the Natural England Licence process and

³ <https://www.gov.uk/government/collections/biodiversity-offsetting>

Potential receptor	Predicted changes and potential effects	Incorporated measure
		mitigation plan will control any authorised disturbance. Site traffic speed limits communicated and adhered to.
Polecat, Brown hare, red squirrel and hedgehog.	Harm/disturbance during construction.	Displacement via phased, directional vegetation clearance, avoiding sensitive life stages e.g. breeding and hibernation. Active translocation in the case of hedgehog. These measures will be detailed in the Mitigation Plan and CEMP.
	Habitat loss/ damage/ severance during construction.	Where required, a habitat creation scheme in non-operational areas, informed by Defra's guidance on pilot biodiversity offsetting, to be detailed in the MP. Subsequent management of habitats for the life of the Moorside Project in accordance with the HMP.
Bats	Harm/ disturbance and loss/ disturbance of roosts during construction.	Where required, roost creation and exclusion from roosts under licence prior to building demolition (where this is necessary). Works would be timed to minimise disruption of life cycles (i.e. avoiding breeding and hibernation periods). Lighting schemes designed to avoid illumination of watercourses, hedgerows, tree lines and other bat foraging habitats. These measures would be detailed in the MP and CEMP.
	Loss/ damage/ severance of bat foraging and commuting habitats during construction.	Where required, a habitat creation scheme to incorporate bats habitats in non-operational areas to be set out in the MP.

Potential receptor	Predicted changes and potential effects	Incorporated measure
		Subsequent management of habitats for the life of the Moorside Project will be undertaken in accordance with the HMP.
Reptiles and Amphibians	Harm during construction	<p>Exclusion of reptiles and amphibians from construction zones and translocation to suitable habitats/ receptor sites in accordance with good practice and under licence as required and as set out in the MP.</p> <p>Sensitive habitats, exclusion fences and receptor sites mapped as part of an ecological constraints plan to accompany the CEMP.</p>
	Loss/ damage/ severance of reptile and amphibian habitats during construction	<p>Where required, a habitat creation scheme to incorporate amphibian/ reptile habitats in non-operational areas in accordance with the MP.</p> <p>Subsequent management of habitats for the life of the Moorside Project in accordance with the HMP.</p>
Terrestrial and Aquatic Invertebrates	Habitat loss/ damage/ severance during construction	<p>Where required, a habitat creation scheme in non-operational areas, informed by Defra's guidance on pilot biodiversity offsetting and also incorporating features that promote invertebrate diversity. This will be set out in the MP.</p> <p>Subsequent management of habitats for the life of the Moorside Project in accordance with the HMP.</p>
Invasive non-native species	Earthworks causing spread of these species within sites and between sites.	Walkover survey prior to earthworks to map and then treat/ dispose of in accordance with good practice and detailed in the CEMP.

Potential receptor	Predicted changes and potential effects	Incorporated measure
Moorside Site only		
Migratory Fish	Harm/mortality associated with the operation of the Circulating Water System and fish return system.	Circulating Water System and fish return system design informed by review of latest knowledge/ good practice to minimise entrainment, impingement and mortality. A returns system designed to modern good practice
Moorside Site and Egremont Site		
Otter	Disturbance or harm of otters during construction.	Otter resting places mapped as part of an ecological constraints plan to accompany the CEMP and disturbance avoided. Where this is unavoidable holts/ couches closed under Natural England Licence and in accordance with the MP. Site traffic speed limits communicated and adhered to and riparian buffers/ exclusion zones established.
	Habitat loss/ damage/ severance during construction.	Habitat creation in non-operational areas; strengthen riparian corridor habitats to improve cover for otters; and lighting schemes designed to avoid illumination of watercourses. These measures to be detailed in the MP and CEMP.
Migratory Fish	Harm/ disturbance due to noise/ vibration during construction. Habitat degradation and pollution due to run-off and sedimentation.	Works in close proximity to the River Ehen timed to avoid October to May to avoid the salmonid spawning season. Avoidance of piling close to the River Ehen wherever possible. These measures to be detailed in the CEMP. The CEMP will also incorporate good practice pollution prevention measures; silt control, drainage management and damping of particulates.

Potential receptor	Predicted changes and potential effects	Incorporated measure
	Loss of bank/ riparian cover during construction.	Strengthen riparian corridor habitats to improve cover/ refuge for salmonids. These measures to be detailed in the MP and HEP.
Freshwater Mussels	Harm disturbance due to noise/vibration, silt mobilisation or in-channel works.	Avoidance of piling close to the River Ehen wherever possible. Mussel survey prior to in-channel or bank engineering works and relocation of mussels under licence where necessary. These measures to be detailed in the MP and HEP.

Table 23.16 Ornithology

Potential receptor	Predicted changes and potential effects	Incorporated measure
Common to all developments		
<p>Annex 1 Species (little egret, merlin, peregrine, golden plover, short-eared owl and kingfisher).</p> <p>Species of Principal Importance NERC Act 2006 (i) Farmland assemblage (linnet, skylark, tree sparrow, yellowhammer, reed bunting, grey partridge); (ii) farmland waders (lapwing, curlew); and (iii) other NERC Species of Principal Importance (grasshopper warbler, song thrush, house sparrow, dunnock, willow tit, spotted flycatcher, starling and bullfinch). Species occurring in regionally or nationally important numbers (linnet, curlew, lapwing)</p>	Construction disturbance in terrestrial areas	Effects on these receptors will be minimised by integrated implementation of a detailed Biodiversity Management Strategy (BMS), and particularly the Construction Environmental Management Plan (CEMP) which will set out how environmental effects will be minimised and effective mitigation measures embedded in activities associated with the site clearance and construction phase.

Potential receptor	Predicted changes and potential effects	Incorporated measure
<p>Annex 1 Species (little egret, merlin, peregrine, golden plover, short-eared owl and kingfisher).</p> <p>Species of Principal Importance NERC Act 2006 (i) Farmland assemblage (linnet, skylark, tree sparrow, yellowhammer, reed bunting, grey partridge); (ii) Farmland waders (lapwing, curlew); and (iii) other NERC Species of Principal Importance (grasshopper warbler, song thrush, house sparrow, dunnock, willow tit, spotted flycatcher, starling and bullfinch).</p> <p>Species occurring in regionally or nationally important numbers (linnet, curlew, lapwing)</p>	Habitat loss	<p>As part of the BMS, a Mitigation Plan will be implemented which will set out the planned work that is required specifically to mitigate effects on protected and priority species and to create habitats to offset habitat loss. Habitat creation proposals would be drafted based on the Defra biodiversity off-setting scheme guidance.</p> <p>Furthermore, the BMS will also contain a Habitat Enhancement Plan (HEP) and Habitat Management Plan (HMP). The HEP will detail the work planned to deliver a positive effect on biodiversity by enhancing the nature conservation value of habitats and their associated species. The HMP will detail the planned management of retained, created and enhanced habitats, during and post-construction.</p>
Schedule 1 of the Wildlife and Countryside Act: kingfisher & barn owl.	Construction disturbance in terrestrial areas	Adherence to the CEMP will ensure that disturbance to these receptors during the breeding season is avoided.
Schedule 1 of the Wildlife and Countryside Act: Barn owl.	Terrestrial construction disturbance	The CEMP will ensure that disturbance to this receptor during the breeding season is avoided.
Moorside Development only		
<p>Annex 1 Species (red-throated diver, great northern diver, Balearic shearwater, Sandwich tern, common/ Arctic Tern, little gull, Mediterranean gull, golden plover, bar-tailed godwit, dunlin)</p>	Construction disturbance in the intertidal and nearshore areas and associated increase in disturbance and displacement associated with marine vessel traffic.	The CEMP will set out how environmental effects will be minimised for this receptor and effective mitigation measures embedded in activities associated with construction in the nearshore and intertidal areas, including pollution prevention measures.

Potential receptor	Predicted changes and potential effects	Incorporated measure
Morecambe Bay and Duddon Estuary pSPA: Sandwich tern.	Construction disturbance in the intertidal and nearshore areas and associated increase in disturbance and displacement associated with marine vessel traffic.	The CEMP which will set out how environmental effects will be minimised for this receptor and effective mitigation measures embedded in activities associated with construction in the nearshore and intertidal areas, including pollution prevention measures.
Duddon Estuary SPA and Ramsar: Sandwich tern.	Construction disturbance in the intertidal and nearshore areas and associated increase in disturbance and displacement associated with marine vessel traffic.	The CEMP which will set out how environmental effects will be minimised for this receptor and effective mitigation measures embedded in activities associated with construction in the nearshore and intertidal areas, including pollution prevention measures.
Morecambe Bay SPA and Ramsar: Sandwich tern, herring gull and lesser black-backed gull.	Construction disturbance in the intertidal and nearshore areas. Increase in disturbance and displacement associated with marine vessel traffic during construction.	The CEMP will set out how environmental effects will be minimised for this receptor and effective mitigation measures embedded in activities associated with construction in the nearshore and intertidal areas, including pollution prevention measures.
Copeland Islands SPA: Manx shearwater.	Increase in disturbance and displacement associated with marine vessel traffic during construction.	The CEMP which will set out how environmental effects will be minimised for this receptor and effective embedded mitigation measures, including pollution prevention measures.
St Bees Head SSSI: Guillemot, fulmar, kittiwake, razorbill, cormorant, puffin, shag, herring gull and black guillemot.	Construction disturbance in the intertidal and nearshore areas and associated increase in disturbance and displacement associated with marine vessel traffic.	The CEMP will set out how environmental effects will be minimised for this receptor and effective mitigation measures embedded in activities associated with construction in the nearshore and intertidal areas, including pollution prevention measures.

Potential receptor	Predicted changes and potential effects	Incorporated measure
Species occurring in regionally or nationally important numbers (sandwich tern, guillemot, razorbill, Manx shearwater, cormorant)	Construction disturbance in the intertidal and nearshore areas and associated increase in disturbance and displacement associated with marine vessel traffic.	The CEMP will set out how environmental effects will be minimised for this receptor and effective mitigation measures embedded in activities associated with construction in the nearshore and intertidal areas, including pollution prevention measures.

Table 23.17 Climate

Potential impact arising from the development	Predicted changes and potential effects	Incorporated measure
Contribution to global carbon emissions through construction phase of the development	Impact on climate change globally	<p>Identify and apply lower carbon measures where appropriate, e.g.: Use of alternative transport modes where possible (for personnel, plant, equipment and materials transfer),</p> <p>Seeking achievement of BREEAM Very Good (or better) standards where appropriate (in non-safety critical buildings for the Moorside Power Station and other buildings to be constructed on the Accommodation Sites and Additional Sites).</p> <p>Consideration of on-site power generation options for the Moorside Site during the construction phase of the MPS.</p>
Potential climate impact	Impact on development	Incorporated measure
Change in precipitation patterns leading to increased heavy precipitation events	Increased risk of flooding	<p>Take into account future rainfall projections during development design and incorporate into flood measures accordingly.</p> <p>A Flood Risk Assessment (FRA) is being carried out for the Project which will consider both terrestrial and marine flooding elements. Findings from the pluvial flooding assessment are reported in Chapter 14, Surface Water.</p>
Increase in sea level	Increased risk of flooding	Take into account projections of sea level rise during development design and incorporate into flood prevention measures accordingly.

Potential impact arising from the development	Predicted changes and potential effects	Incorporated measure
		<p>A Flood Risk Assessment (FRA) is being carried out for the Project which will consider both terrestrial and marine flooding elements. Findings from the coastal flooding assessment are reported within Chapter 15, Marine and Coastal Physical Processes.</p>

Table 23.18 Radiological

Potential receptor	Predicted changes and potential effects	Incorporated measure
Moorside Site		
Humans and biota	Radiological discharges to air and the marine environment above the current baseline during commissioning/operation and decommissioning of the Moorside Power Station.	<p>Generic design needs as dictated by the requirements of the Generic Design Assessment process (which is subject to evaluation and approval by the ONR and the EA) and site specific design measures to minimise radionuclide releases will be implemented to ensure that any emissions are in accordance with regulatory requirements and that the discharge limits set by the EA through the RSA EPR10 environmental permit are not exceeded. These measures will include:-</p> <ul style="list-style-type: none"> <li data-bbox="1429 788 2007 979">) The heights of the stacks through which gaseous radioactive discharges are released has been optimised to achieve a high degree of dispersion and dilution of the effluent plume before it reaches the receptor points; <li data-bbox="1429 995 2007 1123">) The position of the outfall tunnels has been optimised to achieve a high level of dilution of the aqueous radioactive discharges in the marine environment; <li data-bbox="1429 1139 2007 1299">) Abatement systems for the gaseous discharges include filters and delay beds to reduce the amounts discharged of those radionuclides that could result in the highest impact on receptors; <li data-bbox="1429 1315 2007 1378">) Abatement systems for the aqueous discharges include ion exchange resins to

Potential receptor	Predicted changes and potential effects	Incorporated measure
		<p>reduce the amounts discharged of those radionuclides that could result in the highest impact on receptors; and</p> <p>) Shielding incorporated into the design of the reactor buildings and waste handling and storage facilities largely eliminate any direct radiation dose to members of the public.</p>

23.2 Summary of Residual Likely Significant Environmental Effects of the Moorside Project

- 23.2.1 This PEIR has identified the key aspects of the Moorside Project development proposals which are (once incorporated mitigation measures have been taken into account) currently expected to result in likely significant effects, along with a brief description of where and why these effects are expected. As incorporated mitigation measures have been factored in to this assessment, it has been referred to in the topic chapters of this PEIR as an assessment of the residual likely significant effects of the Moorside Project.
- 23.2.2 In some chapters, additional mitigation measures may be proposed to address the likely significant effects identified in the topic chapter. Where this is the case, a further assessment of the residual likely significant effects will then be undertaken which takes account of this additional mitigation.
- 23.2.3 In the ES that is submitted as part of the DCO application in 2017, NuGen will undertake a clear assessment of the likely significant effects of the Moorside Project, taking into account both incorporated mitigation measures and any additional mitigation measures proposed.
- 23.2.4 The following section provides a summary of the residual likely significant environmental effects of the Moorside Project, once the incorporated mitigation measures currently identified have been taken into account. At this stage, no chapters are proposing any additional mitigation due to the preliminary stage of the assessment work. The below section does not provide a complete list of such effects that have been identified, as these are set out in the individual topic chapters. Instead it provides a high level summary of the emerging significant effects of the Moorside Project, based on the work undertaken to date for the PEIR.

Construction Phase

Earthworks - development at the Moorside Site only

- 23.2.5 The earthworks required for the excavation of the nuclear island location, the clearance and levelling of the remainder of the Moorside Site and the construction of the earthworks have the potential to result in Significant effects with respect to air quality and noise for properties in the south of Beckermeth and in the Blackbeck area along the A595. This is due to the scale of the works required and the proximity of the dwellings in these locations.

Mounds - development at the Moorside Site only

- 23.2.6 The mounds that will be located within the boundary of the Moorside Site following the earthworks will also have the potential to result in Significant landscape, visual impact and historic environment effects both during their creation and also once they are fully formed for the construction phase. The

landscape effects will occur due to their height and scale and, the removal of existing features such as Nursery Wood. The effects would be experienced across the Moorside Site itself, and within some of the regional and national classified landscape character areas in the locality.

- 23.2.7 The visual impacts would result from the earthworks required to create the mounds, and also from the size of the mounds themselves. These effects would be experienced by residents and people using facilities such as public rights of way.
- 23.2.8 The construction of the northern mounds will have a Significant effect on the Beckermeth Conservation Area and the setting of the Grade II* listed St Bridget's Church and the scheduled monuments within the churchyard. The proximity of the mounds and the resulting noise, construction movements and visual impact will result in these effects.

Construction activities - development at the Moorside Site only

- 23.2.9 Construction activities relating to some of the larger structures on the Moorside Site, such as the Power Blocks, will also give rise to some significant visual impact effects. These will arise from the views of the construction activities including tall structures such as the cranes that will be needed to build the MPS.

MOLF, breakwaters and CWS - development at the Moorside Site only

- 23.2.10 The construction of the MOLF and its breakwaters, and the CWS has the potential to result in Significant effects on the marine environment, including marine and coastal processes, marine water and sediment quality and marine ecology. The MOLF structure could also create some significant visual impact effects for receptors based along the coast between St Bees Head and Ravenglass.

Sustrans routes 71 and 72 - Moorside Project

- 23.2.11 The Sustrans cycle routes 71 and 72 run through the Corkickle Site, Corkickle to Mirehouse Railway Site and the Mirehouse Site, with route 72 then continuing south to pass through the Egremont Site and Moorside Site as well. These routes will need to be closed in places due to the construction activities and diversions will be provided where relevant. Due to the number and length of some of these diversions, Significant effects on users of the two routes are expected.

Terrestrial Ecology and ornithology - development at the Moorside Site only

- 23.2.12 The clearance of the Moorside Site and the subsequent construction works are expected to create significant effects on a range of habitats and species. This includes the loss of habitats (for example the Starling Castle County Wildlife Site and the Sellafield Tarn County Wildlife Site Ecology) and disturbance to species within and around the indicative development area.

Traffic - Moorside Project

- 23.2.13 Significant effects could occur on the highway network from the increased traffic arising from the construction phase activities, principally those on the Moorside Site. Certain junctions on the A595 have been identified as sensitive to increased traffic numbers.

Economy - Moorside Project

- 23.2.14 The Moorside Project as a whole is likely to give rise to Significant economic benefits to the local economies of Copeland, Allerdale and Cumbria from the increased spend on goods and services from the construction phase, and to a lesser degree from the spend of employees in these areas. Significant benefits are also likely to emerge from increased employment and decreased unemployment in Copeland and Allerdale.
- 23.2.15 Significant adverse effects could occur from the increased demand for private rented accommodation which could cause a shortfall of supply in the Cumbria area.

Operational Phase

Development at the Moorside Site

- 23.2.16 The northern mounds and the large structures contained within the Power Blocks, forebay, pump house and the heavy haul road and the MOLF on the Moorside Site will create Significant landscape and visual impacts during the operational phase.
- 23.2.17 The landscape effects will occur due to the height and scale of these features and would be experienced across the Moorside Site itself, and within some of the localised landscape character areas. From wider landscape character areas, these changes will form part of a landscape already including the Sellafield Site and will not create such a significant change. The visual impacts would result from the proximity and scale of these features and would be experienced by residents and people using facilities such as public rights of way. These effects would principally be experienced within a few kilometres of the Moorside Site, but would also extend to location at greater distances for certain receptors including within the lake District National Park

Economy - Moorside Project

- 23.2.18 The Moorside Project as a whole is likely to give rise to Significant economic benefits to the local economies of Copeland from the increased spend on goods and services during the operational phase. Significant benefits are also likely to emerge from increased employment and decreased unemployment in Copeland.