A83 Rest and Be Thankful

MTS EIAR VOLUME 4, APPENDIX 4.1 – BIODIVERSITY NET GAIN / NATURAL CAPITAL ASSESSMENT

Transport Scotland

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A4-1. Biodiversity Net Gain / Natural Capital Assessment Report

A4-1.1. Introduction

A4-1.1.1. In support of the A83 Rest and Be Thankful Medium-Term Solution (MTS), hereafter referred to as the 'Proposed Scheme', the AtkinsRéalis WSP Joint Venture (AWJV) have developed a combined Biodiversity Net Gain (BNG) and Natural Capital assessment to contribute to the Environmental Impact Assessment (EIA) Report.

Key concepts

A4-1.1.2. The National Planning Framework 4 (NPF4) and the Scottish Government Draft Planning Guidance: Biodiversity mention that "*in order for biodiversity to be 'enhanced' it will need to be demonstrated that it will be in an overall better state than before intervention, and that this will be sustained in the future.*"

A4-1.1.3. The NPF4 policy requirement for enhancement of biodiversity is additional to those existing habitat and species protections that are already in place through legislation and policy and is intended to reinforce the mitigation hierarchy.

A4-1.1.4. Meanwhile, Natural Capital is defined by NatureScot as the elements of nature (e.g. habitats and ecosystems) which "*provide social, environmental and economic benefits to humans*". A Natural Capital approach looks to support the effective management of natural assets by accounting for the value they generate to people, society and businesses via 'ecosystem services'.

Proposed scheme

A4-1.1.5. The Proposed Scheme provides a temporary solution to address the landslide and debris flow risk to the A83. This consists of interventions to the Old Military Road (OMR), which operates as the local diversion of the trunk road network when the A83 is closed, to improve the suitability of the OMR for traffic.

A4-1.1.6. It is understood that the Proposed Scheme will be constructed over a period of approximately one year, starting in 2026. Further information is presented in Volume 2, Chapter 4: The Proposed Scheme.

Legislation, policy and guidance

A4-1.1.7. The Proposed Scheme has various policy drivers concerning biodiversity enhancement and Natural Capital. These drivers comprise specific requirements under NPF4 and the strategic 'environment' objective for the Proposed Scheme.

A4-1.1.8. Via NPF4 The Planning (Scotland) Act 2019 sets out the requirement to protect biodiversity from development, reverse biodiversity loss, deliver beneficial effects from development and strengthen nature networks. NPF4 thus has various cross-cutting requirements relating to biodiversity and Natural Capital.

A4-1.1.9. The Proposed Scheme objective for the environment is *"Protect the environment, including the benefits local communities and visitors obtain from the natural environment, by enhancing Natural Capital assets and ecosystem service provision through delivery of sustainable transport infrastructure."*

A4-1.1.10. The policy drivers for biodiversity enhancement and Natural Capital in Table A4-1-1 below.

Table A4-1-1 – Biodiversity (net gain) and Natural Capital policy requirements

BNG	Natural Capital
NPF4 Policy 3a: "[All] *Development proposals will contribute to the enhancement of biodiversity, including where relevant, restoring degraded habitats and building and strengthening nature networks and the connections between them*." NPF4 Policy 3c: "*Proposals for local development will include appropriate measures to conserve, restore and enhance biodiversity, in accordance with national and*	NPF4 Policy 3d: "*Any potential adverse impacts, including cumulative impacts, of development proposals on biodiversity, nature networks and the natural environment will be minimised through careful planning and design. This will take into account the need to reverse biodiversity loss, safeguard the ecosystem services that the natural environment provides, and build resilience by enhancing nature networks*

BNG	Natural Capital
local guidance. Measures should be proportionate to the nature and scale of development." NPF4 Policy 3d: "*Any potential adverse impacts, including cumulative impacts, of development proposals on biodiversity, nature networks and the natural environment will be minimised through careful planning and design. This will take into account the need to reverse biodiversity loss, safeguard the ecosystem services that the natural environment provides, and build resilience by enhancing nature networks and maximising the potential for restoration*."	*and maximising the potential for restoration*."

A4-1.1.11. The Scottish Government's supplementary Biodiversity: draft planning guidance mentions that national and major developments in Scotland need to demonstrate through the planning application, those ways in which biodiversity will be left in a demonstrably better state than before intervention. It also states that the *"NPF4 does not specify or require a particular assessment approach or methodology to be used" and "assessment may be qualitative or quantitative (for example through use of a metric)."*

A4-1.1.12. To provide assurance in meeting the NPF4 biodiversity requirements, a metric-based approach has been followed to assess the Proposed Scheme: specifically, a BNG approach using the Statutory Biodiversity Metric (as adopted in England) (herein referred to as 'the Metric'). It should be clarified that BNG has no statutory requirement in Scotland. This contrasts with the mandating of this approach in England under secondary legislation arising from the Environment Act. However, the Metric provides a way of measuring and accounting for biodiversity losses and gains resulting from development and/or land management change. The Metric is deemed to provide the most appropriate best practice method in the absence of a Scottish-specific biodiversity accounting tool, to help demonstrate that biodiversity

enhancement is predicted. This approach was discussed and agreed with the A83 Environmental Steering Group (ESG).

A4-1.1.13. To provide assurance in meeting the NPF4 Natural Capital requirements, a Natural Capital assessment has been used to assess the Proposed Scheme; specifically, the use of a metric called the Nature Assessment Tool for Urban and Rural Environments (short: NATURE Tool) (details in Section A4-1.3). The NATURE Tool provides a Natural Capital score for a range of ecosystem services and for the project overall and compares the baseline to the post-development scenario.

Consenting approach

A4-1.1.14. This report aims to demonstrate the compliance of the Proposed Scheme with the biodiversity and natural capital policy requirements described in the previous section. This report includes a BNG and Natural Capital Assessment of the Proposed Scheme. Through the iterative assessment process during the design development, a requirement to provide additional habitat creation and enhancements was identified to ensure that NPF4 requirements and the Proposed Scheme's environmental objective would be achieved. This report also includes a BNG and Natural Capital assessment of the proposals for this additional habitat creation and enhancement.

Approach to BNG and Natural Capital Delivery

A4-1.1.15. To deliver on the various BNG and Natural Capital policy requirements stated in the previous section, two approaches have been followed. First, habitat creation and enhancement of retained habitats on-site within the Proposed Scheme's land take areas, the design for which has been prepared in collaboration with the Landscape design team. Secondly, the identification of two enhancement sites in proximity to the Proposed Scheme. Sites were identified through consultation with Forestry and Land Scotland (FLS) as one of the main landowners in the area local to the Proposed Scheme.

A4-1.1.16. Proposals for each enhancement site were developed, in consultation with FLS, to achieve biodiversity enhancements and minimise potential adverse Natural Capital effects. These enhancement sites have been included within

the Proposed Scheme Boundary. Figures relating to the enhancement sites are provided in:

- Volume 3, Figure 4.7: BNG and Natural Capital MTS Enhancement Sites
- Volume 3, Figure 4.10: Enhancement Sites Baseline Terrestrial and Watercourse Habitat Plan
- Volume 3, Figure 4.11: Enhancement Sites Post Development Terrestrial and Watercourse Habitat Plan.

A4-1.1.17. A full description of the baseline and post development for each of the enhancement sites is provided in the Section A4-1.2

A4-1.2. Biodiversity Net Gain Assessment

Assessment methodology

A4-1.2.1. The Statutory Biodiversity Metric has been used to undertake the BNG assessment to inform the EIA. This approach was discussed and agreed with members of the A83 ESG. The final version of the Statutory Biodiversity Metric used for the assessment was downloaded for use in August 2024.

A4-1.2.2. Whilst the Metric was developed for use in England, it includes all the habitats present within the Proposed Scheme and is in line with Policy 3 of NPF4, which refers to the use of "*best practice assessment methods*" to assess whether a proposal can meet the criteria of conserving, restoring and enhancing biodiversity in the absence of a single accepted methodology for doing so. It is therefore considered to be the most appropriate tool to use for the BNG assessment in a Scottish context at this time. In completing the BNG assessment, consideration has been given to Scottish specifics in terms of habitat importance based on those habitats listed on the Scottish Biodiversity List. Any deviations from the Metric model were transparently outlined and justified.

A4-1.2.3. The output from the Metric has been used to evidence how biodiversity enhancements are provided, in addition to any proposed mitigation. The use of the Metric allows this to be done in a measured and quantifiable way.

A4-1.2.4. This BNG assessment quantifies the baseline biodiversity value (using habitat type and condition as a proxy and measured in biodiversity units) and calculates the predicted biodiversity units for the post development state within the Proposed Scheme Boundary. Area habitat biodiversity units are referred to as HU, with linear habitats - watercourse biodiversity units referred to as WBU. No linear habitat - hedgerows were recorded within the Proposed Scheme baseline, and none are proposed in the post development landscaping; therefore, no hedgerow biodiversity units are described here.

A4-1.2.5. The Proposed Scheme Boundary encompasses the extent of the Proposed Scheme, and the enhancement sites. For the purposes of the BNG assessment, the enhancement sites are entered into the Metric in the offsite tabs (i.e. are excluded from the on-site baseline) as these locations have purely been included in the Proposed Scheme for habitat creation and enhancement purposes and will not be affected by any construction works.

A4-1.2.6. The Proposed Scheme Boundary also includes two locations to be used as necessary for ecological mitigation, labelled Receptor Sites 1 and 2. As there are no habitat changes proposed to these receptor sites, these have been excluded from the BNG assessment. A further location, where an earth bund is to be placed, referred to as 'the earthworks bund in the quarry adjacent to the A83 Trunk Road' (located to the north of the existing A83), has also been excluded from the BNG and Natural Capital assessments as there will only be minimal change to the baseline habitats in this location. Fencing will be placed around this area, at this stage of the project there is limited detail available about the extent of habitat change that would occur as a result of the installation of this fencing, although it is likely to be minimal and as such has been excluded from the BNG and Natural Capital assessments. These locations are shown on Volume 3, Figure 4.8 – Baseline Terrestrial and Watercourse Habitat Plan2. Finally, an area at the eastern end of the Proposed Scheme as shown in Volume 3 Figure 4.1 Scheme Layout Overview has been excluded from the assessment as construction is complete at this location, which was subject to a separate consenting process.

A4-1.2.7. Watercourses and a 15m buffer to the watercourse footprint have also been excluded from the terrestrial BNG assessment.

Terrestrial habitats

A4-1.2.8. The assessment of post-development creation and/or enhancement of HU has been based upon the following criteria:

- all habitat areas that are located within the permanent footprint of the Proposed Scheme are to be lost permanently; and
- all habitat areas that are to be temporarily impacted by construction activities for the Proposed Scheme will be lost; new habitats will be established in accordance with the landscape plan once construction is complete.

A4-1.2.9. The terrestrial habitat baseline HU's have been calculated using the following data sources:

- UK Habitat Classification (UKHab) and Habitat Condition Assessment (HCA) collected in June 2021, and July and August 2022 for the MTS, and April and June 2024 for the enhancement sites.
- Drone footage of the Proposed Scheme and the two enhancement sites was obtained in May 2024, and a review of this imagery against the baseline data was undertaken to provide greater accuracy of habitat distribution.

A4-1.2.10. The UKHab survey was undertaken of all habitats within 250m of the Proposed Scheme Boundary. As part of the UKHab survey condition assessment, data was collected for all habitats in line with Biodiversity Metric 4.0 (this was the current metric at the time of the initial habitat surveys). Vascular plant names recorded during the UKHab and NVC surveys follow 'New Flora of the British Isles 4th Edition' (Stace, 2019), and bryophyte names follow 'A New Checklist of the Bryophytes of Britain and Ireland' (Blockeel et. al, 2020).

A4-1.2.11. All UKHab surveys were carried out by surveyors who hold at least a Botanical Society of Britain and Ireland Field Identification Skills Certificate (FISC) Level 4. The FISC is a test that determines botanical skill level run by the Botanical Society for Britain and Ireland (BSBI). Levels range from 1 (beginner) to 5 (professional) with 6 being awarded in exceptional case. Level 4 is the expected minimum level required for consultants undertaking botanical surveys.

A4-1.2.12. Habitats were mapped using the UKHab system (Version 1.1). UKHab is a hierarchical habitat classification system for the UK. It is compatible with other major existing classifications, including Priority Habitat types (UKHab Level 4) and Habitats Directive Annex I habitat types (UKHab Level 5). All habitats were recorded to at least Level 4 of the UKHab primary habitat hierarchy, Annex I habitats were recorded to Level 5 of the UKHab primary habitat hierarchy. For each habitat area, relevant secondary codes were also recorded. All habitat features were digitally mapped, using Esri Field Maps, as either polygons, lines or points and assigned primary and secondary codes.

A4-1.2.13. A broad scale Minimum Mapping Unit (MMU) was used to map habitats i.e. habitats were only mapped if they were greater than 400m2 in area or 20m in length.

A4-1.2.14. Habitat condition data was collected as part of the UKHab survey based on Condition Assessment Sheets and Methodology for Biodiversity Metric 4.0 (Natural England, 2023). This included collecting answers to the each of the habitat-specific Metric 4.0 condition assessment questions for all of the applicable habitat polygons, lines and points and assigning a score for each criterion, which when summed provides the condition of Poor, Moderate or Good.

Watercourse habitats

A4-1.2.15. The assessment of post-development creation and/or enhancement of Biodiversity Units has been based upon the following criteria:

- all watercourses that are located within the permanent footprint of the Proposed Scheme are to be ‘lost’ permanently i.e. open water ‘lost’ and culvert ‘created’
- subject to specific design elements associated with the Proposed Scheme, watercourses within temporary land take areas will either be retained in the same condition or will reduce in condition (represented within the metric as loss with subsequent creation in reduced condition).

A4-1.2.16. Watercourses (rivers, streams and ditches) are assessed as linear habitats under the Metric, reported separately to core terrestrial (area-based) habitats.

A4-1.2.17. On-site baseline linear Watercourse Biodiversity Units (WBUs) were calculated using a combined desk study and site survey approach. Using GIS, Ordnance Survey mapping was used to calculate the baseline lengths of the watercourses (rivers and streams) within the Proposed Scheme Boundary, including where the Proposed Scheme Boundary falls within the 10m riparian corridor of watercourses. No ditches were present within the equivalent desk study area for ditches (noting that the associated riparian corridor is reduced to 5m for ditch habitats).

A4-1.2.18. Lengths of watercourse within the Proposed Scheme Boundary were delineated into sections of consistent hydro-morphological and riparian character.

A4-1.2.19. To determine the baseline WBUs, four key quality components were assessed and inputted into the Metric (along with length of watercourse within the Proposed Scheme Boundary and within Enhancement Sites). These are:

- distinctiveness (determined by watercourse type)
- strategic significance
- river condition (determined from field-based Modular River Physical Habitat (MoRPh) survey)
- watercourse and riparian encroachment.

Watercourse type, distinctiveness and condition

A4-1.2.20. Watercourse type (i.e. Priority River Habitat, Other Rivers and Streams, Ditches, Canals or Culverts) was identified initially through a desk-based assessment of Ordnance Survey maps, satellite imagery, priority river habitat definitions and historical maps. River distinctiveness is automatically generated in the Metric based on the type of watercourse. Watercourse type, assigned during desk study, was verified based on site visit.

A4-1.2.21. Watercourse condition was assessed using the MoRPh survey methodology that is required to conduct a River Condition Assessment as stated in the Metric. MoRPh surveys were conducted across more than 20% of the watercourses within the Proposed Scheme (as defined by the Metric) between November 2023 and June 2024. MoRPh surveys were conducted by an

accredited MoRPh Pro surveyor. MoRPh survey results were uploaded to the Cartographer platform and a River Type desk-based assessment was conducted in order to complete the River Condition Assessment.

A4-1.2.22. No ditches were identified in the Proposed Scheme Boundary and therefore the ditch condition assessment was not undertaken.

A4-1.2.23. No condition assessment is required for culverts as they are automatically assigned a 'low' condition by the Metric.

Watercourse and riparian encroachment

A4-1.2.24. Watercourse and riparian zone encroachment are features or interventions within the watercourse and riparian zones that reduce the quantity, quality or ecological function of the habitat, including infrastructure and management practice such as agriculture.

A4-1.2.25. These are included within the baseline and post development elements of the Metric and influence the overall WBUs attributable to each watercourse. The riparian zone is defined as a 10m zone from top of the riverbank (for watercourses other than ditches). This area would naturally be periodically flooded and directly influences the hydrological, geomorphological and biological functions and processes within the river channel.

A4-1.2.26. Encroachment is considered as 'No encroachment', 'Minor', 'Moderate' or 'Major' depending on the percentage of bank top occupied by encroachment features and the proximity of these features to the watercourse. Encroachment features are any land use that negatively impacts the functioning of the watercourse, to record 'No encroachment' the riparian corridor would be in a near natural state. Encroachment is not recorded for culverts, instead it is automatically assigned the 'N/A' option within the calculation tool which assigns set multipliers.

Post data collection QA

A4-1.2.27. Project design drawings were converted from Computer-Aided Design (CAD) software to an ArcGIS environment. ArcGIS was then used to calculate the area of each habitat type within the Proposed Scheme and was further

grouped by condition to give the overall area (hectares, ha) or length (kilometres, km) (for watercourses) of each habitat type of each condition level.

Calculating Biodiversity Units using Statutory Biodiversity Metric

A4-1.2.28. The Metric uses a number of measures to quantify baseline biodiversity value for each habitat type within a development site boundary. These measures indicate the habitats' intrinsic value (i.e., its distinctiveness, including rarity and species-richness), its condition (measured across a number of criteria) and its area (in hectares) or length (for watercourses, in kilometres). In addition, the strategic significance of the location of any habitats within a development site boundary and the enhancement sites was taken into account by applying a spatial multiplier.

A4-1.2.29. Strategic significance has been assigned following the methods sets out through the Metric, following a review of local strategies and plans. The following sources of information were reviewed:

- The river basin management plan for Scotland 2021-2027
- Loch Lomond and Trossachs National Park (LLTNP) Trees and Woodland Strategy,
- National Park Partnership Plan (NPPP)
- The Rest and Be Thankful Woodland Creation Plan
- Sitelink
- Defra's Magic Map Application
- Native Woodland Survey of Scotland
- Scotland's Forestry Strategy
- The UK Forestry Standard
- UK Woodland Assurance Standard

A4-1.2.30. As the Proposed Scheme is located within the LLTNP, strategic significance has been assessed as high for all habitats.

A4-1.2.31. A habitat's distinctiveness score is derived from the habitat type's biodiversity value, reflecting the rarity of the plant community, the time it takes to reach maturity, its value to fauna, and its ecosystem function. This score is pre-

assigned and is pre-populated in the Metric based on terrestrial habitat/river type.

A4-1.2.32. Post-development biodiversity units are calculated the same way but with the addition of risk multipliers that take into account the difficulty and time it takes to create new habitat or enhance existing habitat. These temporal and risk related multipliers are set within the Metric and cannot be changed.

A4-1.2.33. In order to calculate the overall net change in HU and WBU, the baseline units were subtracted from the post-development units. Whilst the Metric identifies habitats such as purple moor-grass and rush pastures as being of 'Very High Distinctiveness', in Scotland this habitat type is fairly common and widespread. As a result of degradation this habitat does not always closely match the species' compositions and structure as described in UKHab. To better reflect the value of this habitat within a Scottish context, this widespread habitat has been inputted into the Metric as acid grassland (as presented in the baseline and post development tables A4-1-0 and A4-1-4 respectively), which is valued at medium distinctiveness to ensure that the baseline value is not over estimated.

A4-1.2.34. For the enhancement sites, habitat recorded as 'purple moor-grass and rush pastures', a precautionary approach is taken, and this habitat type is entered into the metric as such. For Site 3a, these habitats are located along river corridors, where the habitat is wetter and more aligned to the UKHab definition of this habitat type and supported greater baseline species diversity. For Site 1 the ground water is heavily influenced by the presence of Stika woodland, it is considered the removal of this, would allow for enhancement of this habitat type with greater species diversity.

Assumptions

A4-1.2.35. The Proposed Scheme construction is anticipated to take approximately one year. It has been assumed that no vegetated habitats would be created until construction has been completed. This includes the habitat creation and restoration proposed for the enhancement sites, which would also commence once construction is completed.

A4-1.2.36. Difficulty and time to target condition (TTTC) values have been assigned as per the values given in the Metric with an additional one year added to all post-development vegetated habitats for the Proposed Scheme (both onsite areas and enhancement sites). Earlier implementation of the management changes to the enhancement sites will be explored as the project progresses and will require further coordination between Transport Scotland and FLS.

A4-1.2.37. Watercourse enhancements within the enhancement sites are driven by riparian habitat improvements that will take time to establish. Therefore, on a precautionary basis, a manual adjustment has been made to account for the establishment of these riparian habitats and more complex riparian habitat vegetation structure (i.e. wooded features that improve watercourse condition). This approach creates a combined delay of 15 years (in addition to the one-year construction delay for Site 1 and 3a) in watercourse enhancement, aligning with the values for woodland creation given in the Metric.

A4-1.2.38. Extremely minor edits were made to the scheme boundary during finalisation of the EIAR (totalling less than 0.1 ha collectively across the Proposed Scheme), but these have not been taken into account in area calculations provided in this report. This is not considered to create any significant limitations on this assessment.

A4-1.2.39. Minor edits were also made to the enhancement site boundaries for Site 1. Changes were below 0.001ha so the HU achieved from these small areas is negligible and therefore this does not affect the BNG and Natural Capital calculations.

A4-1.2.40. Habitats were mapped in the field using professional judgement and informed by aerial imagery. Habitat areas are measured within GIS, which creates a high degree of precision. However, boundaries between habitats are sometimes observed as gradual changes in habitat type, so despite the level of precision in area calculations, there is always a slight element of approximation involved in calculations.

A4-1.2.41. Area calculations are based on areas being rounded to two decimal places before being entered into the Metric. Therefore, there may be a difference of 0.01 hectares (ha) between the Proposed Scheme and total baseline habitat area based on rounding up or down of values. Additionally, areas smaller than 0.01ha appear as 0.00ha in the Metric. The HUs achieved from these small areas are negligible, so this does not affect the BNG calculations.

A4-1.2.42. The following sections of Policy 6 Forestry, Woodland and Trees of NPF4 have been taken into account in the enhancement sites proposals:

c) Development proposals involving woodland removal will only be supported where they will achieve significant and clearly defined additional public benefits in accordance with relevant Scottish Government policy on woodland removal. Where woodland is removed, compensatory planting will most likely be expected to be delivered.

d) Development proposals on sites which include an area of existing woodland or land identified in the Forestry and Woodland Strategy as being suitable for woodland creation will only be supported where the enhancement and improvement of woodlands and the planting of new trees on the site (in accordance with the Forestry and Woodland Strategy) are integrated into the design.

A4-1.2.43. Any woodland removal would follow the Scottish Government's Control of Woodland Removal Policy and guidance on implementation of this policy is provided by Scottish Forestry in Scottish Government's Policy on Control of Woodland Removal: Implementation Guidance (2019). Woodland planting and management proposals undertaken in line with the UK Forestry Standard, the Loch Lomond and Trossachs National Park (LLTNP) National Park Partnership Plan (NPPP), LLTNP Trees and Woodland Strategy, the UKWAS and the Forestry Commission's Creating New Native Woodlands guidance.

A4-1.2.44. As described in Table A4-1-1- Biodiversity and Natural Capital policy requirements, there is a requirement for development proposals to contribute to the enhancement of biodiversity including the restoration of degraded habitats. Therefore, accurately recording the baseline condition of the baseline

habitats is crucial. Within the enhancement sites, the existing baseline habitats were noted to be degraded in many locations, with evidence of native woodland species recorded within coniferous plantation in Site 1, including ancient woodland indicators (AWI), as per 'Ancient Woodland Indicator Plants in Scotland' (Crawford, 2009), and NatureScot. This suggests that in some locations in Site 1, woodland was the original habitat type.

A4-1.2.45. None of the woodland habitats surveyed are likely to be ancient woodlands or Plantations on Ancient Woodland Sites (PAWS), because these habitats supported only very low numbers of species listed as 'Ancient Woodland Indicator Plants in Scotland' (Crawford, 2009), far below the threshold at which ancient woodland status could be inferred. One of these listed species, native bluebell, was present in open habitats dominated by bracken rather than in true woodland, a common situation in western Britain, therefore it is not a reliable indicator of ancient woodland locally.

A4-1.2.46. It is therefore proposed that the restoration of such woodland is undertaken as part of the management of the enhancement sites.

Limitations

A4-1.2.47. In some locations within the enhancement sites, land access was limited due to reasons of health and safety or was limited due to landowner restrictions. In these locations, UKHab classification has been assigned based upon a review of the nearest publicly accessible area and assumptions on the likely habitat types and their condition has been based on the condition of adjacent land of similar composition, characteristics and land management which had been accessible, in combinations with a review of available online mapping resources, historical survey data, and recent drone footage.

A4-1.2.48. A precautionary approach to the baseline HCA has been taken for habitats within the enhancement sites for locations which could not be accessed, using the condition that was recorded in adjacent parcels of the same habitat type, as follows:

- purple moor-grass and rush pastures and fens are assumed to be in moderate condition.

- other coniferous woodland (non-native conifer plantation) is assumed to be in poor condition.

A4-1.2.49. Given that not every individual watercourse was subject to survey (see Annex 4.1.A), there is a risk that the condition of certain watercourse extents has been misclassified during the assessment. However, MoRPh survey effort exceeded the 20% coverage requirement dictated by the MoRPh method, and survey effort is therefore not considered a significant limitation in the context of the overall assessment.

A4-1.2.50. Outline designs have been produced for the enhancement sites, in consultation with FLS. These provide indicative locations for habitat enhancements and creation. As the project progresses detailed habitat management plans will be produced for each site, and during the development of these there may be some adjustments to the plans. It is however considered that the indicative plans provide a sufficiently accurate level of detail at this stage of the project to inform the BNG assessment and level of predicted change in biodiversity that can be achieved through these sites.

A4-1.2.51. The enhancement site habitat management proposals will be developed further at the detailed design stage of the project in agreement with FLS. For example, detailed aspects such as deer management, including the location of deer fencing, will be refined in the detailed habitat management plans which will be developed as the project progresses. Due to the presence of invasive non-native species (INNS) within the Proposed Scheme, an appropriate INNS management plan will be developed by the appointed contractor.

A4-1.2.52. A phasing approach is beyond the scope of the enhancement sites proposal at this stage. A precautionary approach has been taken to the calculations, which means the TTTC takes account of potential delays between habitat losses and habitat creation. The appointed enhancement sites contractor would be responsible of proposing a phased approach, if required.

A4-1.2.53. In advance of any finalisation of enhancement plans, peat probing is proposed to be undertaken in these areas to identify any areas of deeper peat. This would include existing vegetation analysis, visual evidence of disturbed

ground to augment the probe data, and topography at the location in assessing whether deep deposits are likely.

A4-1.2.54. The proposed planting within the BNG / Natural Capital areas will be developed based upon these results taking account of areas of deep peat and seeking to avoid impacts to these areas where possible. This will be an iterative process and will be informed through discussions with Forestry and Land Scotland and will be reflected in updates to the BNG / Natural Capital Assessment and the Outline Peat Management Plan as the project progresses through Specimen and Detailed Design.

BNG Results

Proposed Scheme Baseline

A4-1.2.55. A summary of the habitat baseline within the Proposed Scheme is shown in Table A4-1-2 and Table A4-1-3 below. Baseline habitats are shown in Volume 3, Figure 4.8-Baseline Terrestrial and Watercourse Habitat Plan. Areas and percentages are rounded to two decimal points in the below table. The area occupied by the watercourses plus a 15m buffer has been removed from the habitat area calculations, as per Volume 3, Figure 9.3 - Landscape and Ecological Mitigation. Note there are no terrestrial linear habitats present within the Proposed Scheme.

A4-1.2.56. The baseline condition of watercourses within the Proposed Scheme is summarised within Annex A.

Table A4-1-2 – Summary of terrestrial habitats baseline: Proposed Scheme

UKHab Level 4 Primary Habitat Type	Habitat Condition	Habitat Area (ha)	Percentage cover of habitat %	Habitat Units (HU)
Temporary grass and clover leys	N/A	0.02	0.23	0.05
Upland flushes, fens and swamps (non-Annex I)	Good	1.39	15.39	38.36

UKHab Level 4 Primary Habitat Type	Habitat Condition	Habitat Area (ha)	Percentage cover of habitat %	Habitat Units (HU)
Upland acid grassland (of which 0.21ha is f2b - Purple moor grass and rush pastures)	Good	0.31	3.43	4.28
Upland acid grassland (of which 1.25ha is f2b - Purple moor grass and rush pastures)	Moderate	1.25	13.93	11.50
Upland acid grassland	Poor	0.05	0.61	0.23
Bracken	N/A	1.62	17.99	3.73
Upland calcareous grassland (non-Annex I)	Good	0.06	0.62	1.24
Upland calcareous grassland (non-Annex I)	Poor	0.04	0.17	0.28
Other neutral grassland	Good	1.07	11.85	14.77
Other neutral grassland	Moderate	0.46	5.15	4.23
Other neutral grassland	Poor	0.1	1.09	0.46
Upland heathland	Good	0.02	0.22	0.41
Upland heathland	Moderate	0.2	2.17	2.76
Upland heathland	Poor	0.02	0.17	0.14
Bramble scrub	N/A	0.3	3.36	1.38
Mixed scrub	Good	0.06	0.66	0.83
Developed land; sealed surface (non-buildings)	N/A	1.85	20.56	N/A

UKHab Level 4 Primary Habitat Type	Habitat Condition	Habitat Area (ha)	Percentage cover of habitat %	Habitat Units (HU)
Built linear features	N/A	0.19	2.09	N/A
Total (Habitat Units)	N/A	N/A	N/A	84.64

Table A4-1-3 – Summary of aquatic habitats baseline: Proposed Scheme

UKHab Level 4 Primary Habitat Type	Habitat Condition	Length within Survey Area (km)	Percentage cover of habitat %	Watercourse Biodiversity Units (WBU)
Culvert	Poor	0.36	16	0.56
Other rivers and streams	Fairly Good	0.03	1	0.43
Other rivers and streams	Moderate	1.47	66	15.25
Other rivers and streams	Fairly Poor	0.37	17	2.89
Total (WBU)	N/A	2.23	100%	19.13

Proposed Scheme Post Development

A4-1.2.57. A summary of the habitats predicted to be created onsite post development within the Proposed Scheme is shown in Table A4-1-4 and Table A4-1-5 below; post development habitats are shown in Volume 3, Figure 4.9 - MTS Post Development Terrestrial and Watercourse Habitat Plan.

A4-1.2.58. The majority of habitat loss will be a partial loss of purple moor grass and rush pasture, bracken, upland flushes, and fens and swamps and upland acid grassland (each of less than 2ha each), with partial losses of less than 1ha each to other neutral grassland, upland heathland, and loss of all areas of upland calcareous grassland, bramble scrub, mixed scrub, and temporary grass and clover leys. Gains in habitat extent within the Proposed Scheme as shown within the Landscape Mitigation Plan (LTS Landscape Mitigation

Drawing A83AAB-AWJ-ELS-LTS_GEN=DR-LE-000005 to 000014) in addition to an additional 0.25ha of the Proposed Scheme infrastructure (man-made urban habitat categories) will comprise 6.35ha of other neutral grassland, and approximately 0.3 ha of rural tree.

A4-1.2.59. Due to rounding up within the Metric, where an area of retained habitat totals less than 0.001ha, these are not included in the below table. The category of Broadleaved woodland/scrub within Volume 3, Figure 9.3 - Landscape and Ecological Mitigation is categorised as “Individual tree - Rural tree” within the Metric, as these will be planted as scattered trees at 5m spacings, and given the patchy extent, this planting is not considered to create woodland in ecological terms. Individual trees sit within the wider baseline habitat, with their canopy above areas of another habitat, so the area of ‘individual trees’ does not form part of the overall percentage of habitat to avoid double counting.

Table A4-1-4 – Summary of terrestrial habitats post development: Proposed Scheme

UKHab Level 4 Primary Habitat Type	Habitat Condition	Habitat Area (ha)	Percentage cover of habitat %	Habitat Units (HU)
Upland acid grassland (of which 0.04ha is Purple moor grass and rush pastures	Good	0.04	0.44	0.55
Upland acid grassland (of which 0.18ha is Purple moor grass and rush pastures)	Moderate	0.18	2.00	1.66
Upland acid grassland	Poor	0.02	0.22	0.09
Upland flushes, fens and swamps (non-Annex I)	Good	0.07	0.78	1.93
Bracken	N/A	0.02	0.22	0.05
Other neutral grassland	Good	6.46	71.70	60.74
Other neutral grassland	Moderate	0.04	0.44	0.37

UKHab Level 4 Primary Habitat Type	Habitat Condition	Habitat Area (ha)	Percentage cover of habitat %	Habitat Units (HU)
Upland heathland	Moderate	0.01	0.11	0.14
Developed land; sealed surface (non buildings)	N/A	2.1	23.31	0.00
Built linear features	N/A	0.07	0.78	0.00
Individual tree: Rural Tree	Moderate	0.296	N/A	1.00
Total (Habitat Units)	N/A	N/A	N/A	66.52

Table A4-1-5 – Summary of aquatic habitats post development: Proposed Scheme

UKHab Level 4 Primary Habitat Type	Habitat Condition	Length within Survey Area (km)	Percentage cover of habitat %	Watercourse Biodiversity Units (WBU)
Culvert	Poor	0.65	29%	0.63
Other rivers and streams	Fairly Good	0.02	1%	0.31
Other rivers and streams	Moderate	0.70	31%	7.19
Other rivers and streams	Fairly Poor	0.66	29%	2.08
Other rivers and streams	Poor	0.21	9%	0.33
Total (WBU)	N/A	2.23	100%	10.55

Summary of Proposed Development Biodiversity Change

A4-1.2.60. A summary table of the baseline and predicted post development HU for the Proposed Development is provided in Table A4-1-6.

Table A4-1-6 – Summary of habitats post development: Proposed Scheme

Habitat Type	Baseline Habitat Units	Predicted Post Development Habitat Units	Change in Habitat Units	% Change
Terrestrial (HU)	84.64	66.52	-18.12	-21.40%
Aquatic (WBU)	19.13	10.55	-8.58	-44.83%

Enhancement sites baseline: Site 1

A4-1.2.61. A summary of the habitat baseline for Site 1 is shown in Table A4-1-7 and Table A4-1-8 below; baseline habitats are shown in Volume 3, Figure 4.10 - Enhancement sites Baseline Terrestrial and Watercourse Habitat Plan .

Table A4-1-7 – Summary of terrestrial habitats baseline: Site 1

Habitat Type	Habitat Condition	Habitat Area (ha)	Habitat Units (HU)
Purple moor grass and rush pastures (non-Annex I)	Moderate	2.73	50.23
Purple moor grass and rush pastures (non-Annex I)	Good	0.37	10.21
Upland heathland	Moderate	1.07	14.77
Other coniferous woodland	Poor	3.06	7.04
Broadleaved woodland	N/A	3.06	N/A
Fens (upland and lowland) (non-Annex I)	Moderate	0.68	12.51
Mixed scrub	Poor	0.01	0.05
Bracken	N/A	0.02	0.05
Total (Habitat Units)	N/A	N/A	94.85

Table A4-1-8 – Summary of aquatic habitats baseline: Site 1

UKHab Level 4 Primary Habitat Type	Habitat Condition	Length within Survey Area (km)	Percentage cover of habitat %	Watercourse Biodiversity Units (WBU)
Other rivers and streams	Fairly Good	0.67	100	8.67
Total (WBU)	N/A	0.67	100	8.67

Enhancement sites post development: Site 1

A4-1.2.62. For Site 1 it is proposed that all Sitka spruce plantation including young regenerating Sitka spruce, and any dense Sitka spruce needle litter, arisings and brash that could limit broadleaved woodland creation, is removed whilst minimising soil disturbance. Bracken and small areas of scrub will be retained. In the locations where the plantation is removed, an open mosaic of planted broadleaved woodland would be created, across the felled footprint, covering approximately 3ha, in moderate condition. Conifer plantation woodland extraction and management of new woodland will be refined in the detailed habitat management plans, which will be developed with FLS as the project progresses.

A4-1.2.63. For the mosaic of purple moor-grass rush pasture and fens, the presumption is that enhancement of the habitat condition would be achievable through the removal of Sitka spruce, which is likely to result in local changes to the water table. Additionally, the removal of regenerating Sitka saplings and young trees, stumps, needles and brash (where this is feasible whilst minimising soil disturbance) would permit the regeneration of the wetland habitats with a reduction in shade and smothering by needle litter and brash. Together the recommended changes are predicted to enhance the overall condition of the purple moor-grass and rush pastures and fens from moderate to good.

A4-1.2.64. The removal of the Sitka plantation and regenerating Sitka woodland would remove shading of the upland heathland habitats and in combination with the installation of deer fencing (where feasible and necessary) would permit the recovery of previously suppressed heather and bilberry. In time this would

result in a greater diversity of heather age class and overall percent coverage of dwarf shrubs. It is predicted that an increase in the condition of the upland heathland from moderate to good would occur.

A4-1.2.65. Additional natural regeneration of native woodland would be feasible at Site 1 in the presence of deer fencing and suitable management and would be included within any management plans that are developed. However, it would only be possible to make a modest estimate of extent and condition that might be achieved, and the success of such regeneration management might not be achieved within the same timelines as described within the Metric. Therefore, native woodland regeneration has not been included with the BNG calculations.

A4-1.2.66. Under the existing baseline, negative watercourse MoRPh indicators are predominantly associated with reduced riparian habitat complexity and an absence of wooded features normally associated with broadleaved tree cover, which is a legacy of agricultural (including forestry plantation) land use. Collectively, the proposed enhancement measures (removal of plantation/regeneration and riparian planting with broadleaved species), will therefore also improve the condition of tributary watercourses of the High Glen Croe Tributary within Site 1, where such measures fall within the 10m riparian corridor. Enhancement measures are translated within the metric to a reduction in riparian encroachment (from major to no encroachment) and an increase of one condition class (from fairly good to good).

A4-1.2.67. An indicative example of assumed changes in watercourse MoRPh indicators pre- and post- enhancement (that underpin assumed condition change within watercourses) is provided in Annex 4.1.B.

A4-1.2.68. A summary of the habitats post development is shown in Table A4-1-9 and Table A4-1-10 below; post development habitats are shown in Volume 3, Figure 4.11 - Enhancement Sites Post Development Terrestrial and Watercourse Habitat Plan.

Table A4-1-9 – Summary of terrestrial habitats post development: Site 1

Habitat Type	Habitat Condition	Habitat Area (ha)	Habitat Units (HU)
Purple moor grass and rush pastures (non-Annex I)	Good	2.73	54.92
Purple moor grass and rush pastures (non-Annex I)	Retained as is: Good	0.37	10.21
Upland heathland	Good	1.07	17.11
Broadleaved woodland	Moderate	3.06	15.92
Fens (upland and lowland) (non-Annex I)	Good	0.68	13.81
Scrub	Retained as is: Poor	0.01	0.05
Bracken	Retained as is: N/A	0.02	0.05
Total (Habitat Units)	N/A	N/A	112.07 (+17.21)

Table A4-1-10 – Summary of aquatic habitats post development: Site 1

UKHab Level 4 Primary Habitat Type	Habitat Condition	Length within Survey Area (km)	Percentage cover of habitat %	Watercourse Biodiversity Units (WBU)
Other rivers and streams	Good	0.67	100	12.43
Total (WBU)	N/A	0.67	100	12.43 (+3.76)

Enhancement sites baseline: Site 3a

A4-1.2.69. A summary of the habitat baseline is shown in Table A4-1-11 and Table A4-1-12 below; baseline habitats are shown in Volume 3, Figure 4.10 - MTS Enhancement Sites Baseline Terrestrial and Watercourse Habitat Plan.

Table A4-1-11 – Summary of terrestrial habitats baseline: Site 3a

Habitat type	Habitat Condition	Habitat Area (ha)	Habitat Units (HU)
Purple moor grass and rush pastures	Moderate	2.39	43.98
Purple moor grass and rush pastures	Good	0.12	3.31
Fens (upland and lowland)	Good	0.23	6.35
Other neutral grassland	Good	0.63	8.69
Other coniferous woodland	Poor	0.07	0.16
Total (Habitat Units)	N/A	N/A	62.49

Table A4-1-12 – Summary of aquatic habitats baseline: Site 3a

UKHab Level 4 Primary Habitat Type	Habitat Condition	Length within Survey Area (km)	Percentage cover of habitat %	Watercourse Biodiversity Units (WBU)
Priority river habitat	Fairly Good	1.00	100	17.25
Total (WBU)	N/A	1.00	100	17.25

Enhancement sites post development: Site 3a

A4-1.2.70. The proposed interventions for Site 3a include the retention of the great majority of the very high distinctiveness habitats: Purple moor grass and rush pastures and Fens (upland and lowland).

A4-1.2.71. These would be enhanced by a reduction in sheep grazing pressure within grassland areas to permit a more varied sward structure to develop, and

removal of excessive thatch in purple moor-grass rush pastures in targeted areas. The enhancement measures would be undertaken to improve habitat condition of both grassland and wetland habitats to good condition.

A4-1.2.72. Within the remaining riparian margins of these habitats, low density tree planting would be undertaken sensitively in suitable areas to create a mosaic which includes up to 10% of the area to be occupied by planted broadleaved woodland along the riverbank. In combination with the removal of all non-native Sitka spruce plantation woodland and any regenerating Sitka spruce, to be replaced with planting of a broadleaved woodland mix, this would result in the creation of approximately 0.07 ha of broadleaved woodland.

A4-1.2.73. Fencing or other measures may be necessary to protect newly developing woodland from deer and sheep grazing.

A4-1.2.74. Removal of any INNS such as rhododendron shall also be undertaken within this Site.

A4-1.2.75. Under the existing baseline, negative watercourse MoRPh indicators are predominantly associated with reduced riparian habitat complexity and an absence of wooded features normally associated with broadleaved tree cover, which is a legacy of agricultural (including forestry plantation) land use. INNS also contribute to negative watercourse MoRPh indicators. Collectively, the proposed enhancement measures (riparian planting, exclusion fencing, where feasible, reduced grazing pressure and removal of INNS), will therefore also improve the condition of the High Glen Croe Tributary within Site 3a, where such measures fall within the 10m riparian corridor. Enhancement measures are translated within the metric to a reduction in riparian encroachment (from major to no encroachment) and an increase of one condition class (from fairly good to good).

A4-1.2.76. An indicative example of assumed changes in watercourse MoRPh indicators pre- and post- enhancement (that underpin assumed condition change within watercourses) is provided in Annex 4.1.B.

A4-1.2.77. A summary of the habitats post development is shown in Table A4-1-13 and Table A4-1-14 below; post development habitats are shown in Volume 3,

Figure 4.11 - Enhancement sites Post Development Terrestrial and Watercourse Habitat Plan.

Table A4-1-13 – Summary of terrestrial habitats post development: Site 3a

Habitat type	Proposed Condition	Habitat Area (ha)	Predicted Post Enhancement Habitat Units
Purple moor grass and rush pastures	Good	2.39	48.08
Purple moor grass and rush pastures	Retained as is; Good	0.12	3.31
Fens (upland and lowland)	Retained as is; Good	0.23	6.35
Other neutral grassland	Retained as is; Good	0.63	8.69
Other coniferous woodland	Moderate	0.07	0.36
Individual Rural Tree	Moderate	N/A	1.10
Total (Habitat Units)	N/A	N/A	67.89 (+5.41)

Table A4-1-14 – Summary of aquatic habitat post development: Site 3a

UKHab Level 4 Primary Habitat Type	Habitat Condition	Length within Survey Area (km)	Percentage cover of habitat %	Watercourse Biodiversity Units (WBU)
Priority river habitat	Good	1.00	100	24.74
Total (WBU)	N/A	1.00	100	24.74 (+7.49)

A4-1.3. Natural Capital Assessment

Assessment methodology

A4-1.3.1. The NATURE Tool was selected for the Natural Capital Assessment. The NATURE Tool allows the assessment of up to 17 ecosystem services, plus physical and mental health benefits, through a scoring system, indicating both the direction and magnitude of project impacts. These scores are aggregated based on policy priorities resulting in an overall Natural Capital Score for the project.

A4-1.3.2. The development of the NATURE Tool was led by WSP and the Ecosystems Knowledge Network, in collaboration with Northumbria University, and first released in July 2021. The tool has been co-developed together with more than 30 organisations involved in the built environment industry. Furthermore, the NATURE tool is aligned with Defra's Enabling a Natural Capital Approach (ENCA) guidance, recognised as a recommended tool within the Ecosystems Knowledge Network tool assessor, which is listed within ENCA's featured tools. Additionally, the approach taken by the NATURE Tool broadly aligns with the HM Treasury Greenbook and ENCA-supported 4-step approach to Natural Capital in policy and project appraisal: helping to understand the environmental baseline, how assets are affected in terms of habitat losses, the implications to welfare as a function of ecosystem service delivery, and finally to consider uncertainties when comparing Natural Capital scores.

A4-1.3.3. NATURE Tool version 1.2 BETA has been used for this assessment which was the latest NATURE Tool version at the time of the analysis. The full NATURE Tool scope has been applied meaning the impact across 17 ecosystem services plus physical and mental health benefits has been indicated.

A4-1.3.4. The same habitat data that informs the BNG assessments (see Section A4-1.2) also inform the NATURE Tool assessments. However, the NATURE Tool only utilises habitat area data which means that rivers were considered as area rather than lines. Also, the NATURE Tool has its own habitat classification system and UK Habitats were translated into the NATURE Tool habitat classification system which aligns well with UKHab.

A4-1.3.5. The NATURE Tool is flexible in terms of data requirements and can work with basic and advanced data. For this assessment, an advanced assessment has been conducted meaning that advanced indicators and data were utilised as far as possible (see assumptions and limitations sections) to inform the assessment, providing the greatest level or accuracy.

A4-1.3.6. The NATURE Tool is flexible in terms of data requirements and can work with basic and advanced data. For this report, an advanced assessment has been conducted meaning that advanced indicators and data were utilised as far as possible (see Sections Assumptions and Limitations) to inform the assessment, providing the greatest level or accuracy.

A4-1.3.7. Examples for advanced indicators include the slope steepness where a steeper slope indicates higher demand for erosion protection or a flood management opportunity model that indicates areas within (proximity to) watercourses and surface water flood zones where habitats that mitigate flood risk would be particularly effective. The full list of NATURE Tool indicators and which ecosystem services/benefits they inform is given in Plate A4-1.1.

Plate A4-1.1 – NATURE Tool Indicators and Informed Ecosystem Services and Benefits

Indicator	Biodiversity	Mental Health	Physical Health	Aesthetic Values	Education & Knowledge	Interaction with Nature	Recreation	Sense of Place	Air Quality Regulation	Carbon Storage	Cooling & Shading	Erosion Protection	Flood Regulation	Water Quality Regulation	Pest Control	Pollination	Food & Fish - Commercial	Food & Fish - Community	Water Availability	Wood Production
Community Food & Fishing		■	■															■		
Commercial Food & Fishing																	■			
Woodland Management																				■
Nature Designations		■	■	■	■	■		■												
Education		■			■															
Population Density & Visitors		■	■	■	■	■	■	■	■		■									
Water Status for Sub-Catchment														■						
Grazing & Mowing										■										
Air Quality Management Area			■						■											
Flood Risk & Watercourse			■										■							
Annual Winter Rainfall												■								
Slope Steepness												■								
Photovoltaic									■											

A4-1.3.8. This assessment is a projection, meaning the project has not been implemented yet. For a projection, the NATURE Tool applies a risk factor acknowledging that an intended habitat creation or reinstatement (after construction) may fail, depending on the difficulty of the habitat creation. This habitat creation risk is acknowledged in the scoring system.

A4-1.3.9. The NATURE Tool also accounts for the fact that habitats usually need to mature until they reach their full potential to deliver maximum ecosystem service benefits. This means that, for the same habitat area and type, a newly created habitat tends to score lower than an existing (retained) habitat as the latter is assumed to have already reached its full Natural Capital potential and optimal maturity for maximum ecosystem services delivery.

A4-1.3.10. The Natural Capital outputs have been presented using the NATURE Tool's summary results table, which includes two main indicators relevant for this assessment:

- Score Change: The score change indicates the impact of the project on the score for each service/benefit. The score change is calculated by subtracting the 'Baseline Score' from the 'Project Score' (considering the post-development state of the site but also takes the Natural Capital performance during the construction phase into account).
- Change Score: This is the main indicator for measuring project success in terms of Natural Capital impact. For each assessed ecosystem service and benefit, the Change Score indicates the percentage change against the baseline. A Change Score of +30%, for example, indicates that the service provision would be 30% higher than it would have been if the baseline state of the site remained in place. If the Change Score is greater than +100%, it will simply be displayed as >100%. A positive Change Score generally indicates a positive impact on Natural Capital. The higher the Change Score, the greater the indicative ecosystem service/benefit. The Change Score is calculated by dividing the 'Score Change' by the 'Baseline Score'.

A4-1.3.11. Annex 4.1.C provides a full glossary of more terms used in NATURE Tool, including the ecosystem services' definitions. Please refer to the NATURE Tool User Guide for more technical detail on how the NATURE Tool model works and how scores and values are calculated.

A4-1.3.12. Please note that some manual NATURE Tool model adjustments were made to optimise the assessment, namely:

- Woodland management: In the standard NATURE Tool 1.2 model, woodland management only has an impact on Wood Production scores but not on other ecosystem services. Arguably, felling woodland would reduce the provision of other ecosystem services such as carbon storage. A manual NATURE Tool model adjustment was applied so that after 50 years (assumed year of felling rotation), the average carbon storage score between year 1 and 50 has been used from year 51 onwards, reflecting the average score during a felling rotation. This is to reflect that, on average, less carbon is stored in a woodland in felling rotation compared to a woodland that would not be felled regularly. Whilst many commercial woodlands are felled after 30-40 years, 50

years has been used as a precautionary assumption to not under-estimate baseline ecosystem services provision.

- Habitat enhancements: In the standard NATURE Tool 1.2 model, habitat enhancements are not considered. When a habitat change occurs, the model always assumes that the baseline habitat is removed first and then a new habitat is created. This assumption leads to under-valuation when habitats are enhanced, e.g. when woodland is planted on top of grassland without first removing the grassland. The current model therefore effectively penalizes habitat enhancements. The model was therefore manually adjusted so that where the baseline habitat score in a given year is higher than the score of the newly created habitat, the baseline score still applies. Once the post-intervention habitat scores higher, that score applies. Where more than one baseline habitat was enhanced, the area-weighted baseline scores were used. Where the maximum post-intervention habitat score is lower than the (average) baseline habitat score in a given year, the applied score in a given year is capped at the post-intervention maximum. These adjustments better reflect the transition from one habitat to another where habitats are enhanced. This adjustment was not applied for all habitats. Where coniferous woodland is enhanced to broadleaved woodland, it needs to be felled first. Hence, the standard model of baseline habitat removal and creation of new habitat was still applied.

Policy Priorities Definition

A4-1.3.13. In the NATURE Tool, policy priorities determine how ecosystem services and benefits are weighted when aggregated to an overall Natural Capital Score. To reflect the main objectives of the Proposed Scheme and the main policies applied nationally and locally, the policy priorities of the NATURE Tool have been tailored to the specific site context of the Proposed Scheme and the enhancement sites as far as possible using desk-based information. The policy priorities were categorised between High (H), Medium (M), and Low (L) and translate into aggregation weights as 3, 2 and 1 respectively. Annex 4.1.D presents the summary of the ecosystem services prioritisation developed for the assessment for the Proposed Scheme and the enhancement sites.

A4-1.3.14. The following documents were consulted to define the relevance of each ecosystem service for the Proposed Scheme:

- NPF4
- National Transport Strategy 2
- Strategic Transport Projects Review 2 (STPR2)
- Initial appraisal: Case for Change - Argyll and Bute - STPR2
- Argyll and Bute Council Biodiversity Duty Action Plan
- National Park Partnership Plan
- Access to Argyll and Bute – A83 Story Map.

A4-1.3.15. In the case of the enhancement sites, the ecosystems services priorities needed a further review. The ecosystem services priorities for each site were checked with FLS and re-categorised accordingly.

Assumptions

A4-1.3.16. The following assumptions were made for the assessment of the Proposed Scheme and the enhancement sites:

- Table A4-1-15 below shows the different timeframes used in the assessments.

Table A4-1-15 – Proposed Scheme timeframes used in the Natural Capital Assessment

	Proposed Scheme	Enhancement sites
Construction time	1	0 (less than a year)
Completion year	2027	2027
Project lifetime	120 years	100 years (the enhancement sites are assumed to be manage as the post-development proposals in perpetuity)

- For the Proposed Scheme, default values were used for habitat ages; therefore, all the habitats were assumed to have reached maturity for the baseline.
- The NATURE Tool by default assumes that baseline habitats have fully matured and achieved their ecosystem service potential. However, if habitat age data is available, it should be adjusted in the tool to better

reflect the actual delivery of ecosystem services. For the enhancement sites, aside from woodland, all the other habitats were assumed to have reached maturity for the baseline condition. Woodland age was adjusted based on woodland planting age information provided by FLS as follows:

  - Site 1: 34 years
  - Site 3a: 64 years

- For all the assessments, following the NATURE Tool guidance, a 50m buffer was applied to all linear access datasets to define the 'Public footpath access' areas. The following datasets were reviewed in order to classify the accessibility of the sites:
  - Loch Lomond and the Trossachs NP Core Paths (Jacobs, 2022)
  - Loch Lomond and the Trossachs NP Core Paths Corridor (Jacobs, 2022)
  - Sustrans reclassified routes (Jacobs, 2022)
  - Sustrans removed routes (Jacobs, 2022)
  - Hillwalking Routes (Jacobs, 2022)
  - Forest Recreation Routes (Jacobs, 2022)
  - National Cycle Network (Sustrans, 2022)
  - Argyll and Bute Core Paths (Argyll and Bute Council, 2022)
  - Core Paths Scotland (Jacobs, 2022)
  - Scotland's Great Trails (Scottish National Heritage, 2022)

- For the Proposed Scheme, all other areas that were not assessed as 'Public footpath access' were considered as 'Restricted access' as a proxy for right to roam.
- For the enhancement sites, all other areas that were not assessed as 'Public footpath access' were considered as 'No access' as they are effectively inaccessible.
- In the post-development scenario, Sites 1 and 3a do not have any changes regarding accessibility and uses the same data as the baseline data.
- For all the assessments, all areas of coniferous woodland are assumed to be 'primarily managed for wood production,' where areas of broadleaved woodland are assumed not to be managed for wood production.

- For all the assessments, local population density was assessed to be <5 persons per hectare.
- For the Proposed Scheme, external visitors were assumed to be 'low' (equivalent to an area with a population density of 20 - 39 persons per hectare).
- For the enhancement sites, external visitors were assumed to be 'low' (equivalent to an area with a population density of 20 – 39 persons per hectare) for Site 1, accounting for enhanced visitation as a result of the 'Rest and Be Thankful' viewpoint located nearby and the implementation of a new footpath. For Site 3a external visitors are assumed to be insignificant.
- For all the assessments, the water quality was assigned as 'Moderate overall class (Water Framework Directive class)' based on SEPA's Water Classification Hub.
- For all the assessments, default values for grass habitat areas relevant to carbon storage have been used due to lack of information. The default classification in the NATURE Tool is 'Non-degraded Grassland'.
- For the Proposed Scheme, educational visits were considered non applicable.
- For all the assessments, default values for educational visits were used for the assessments due to lack of information.
- For all the assessments, the whole glen was stated to have 10+ days of winter rain over 10mm based on the Met Office data.

Limitations

A4-1.3.17. The Natural Capital Assessment presents following limitations:

- The Metric accounts for the linear water features (e.g. Other rivers and streams) in km, while the NATURE Tool considers them areas (ha). Therefore, there is a difference in some habitats' total area.
- The habitat area used in the Metric and the NATURE Tool rounded numbers differently. While the data input in the Metric used two decimals, the input data in the NATURE Tool used four decimals.
- Site 3a post development proposals are to have 10% of the habitat area (purple moor grass and rush pastures, upland flushes, fens and swamps, and other neutral grassland) planted with scattered broadleaved trees. To account for this addition in the NATURE Tool, 10% was subtracted from the total area of these habitats and attributed to "other woodland,

broadleaved". In contrast, the Metric (used for the BNG assessment) allows for the area of "individual rural trees" and understorey area without double counting issues, and no area subtraction was needed. Hence, there is a difference in the total area of the mentioned habitats.

- Volume 3, Figure 9.3 - Landscape and Ecological Mitigation include scattered woodland/scrub across different areas of the Proposed Scheme. In the NATURE Tool assessment these areas were classified as "other woodland, broadleaved", given that there would be only a 5m distance between the trees. However, the BNG terrestrial assessment considered these as "individual rural trees" to account for the understorey habitats. Therefore, there is a discrepancy between the classification of these areas in both assessments.
- The NATURE Tool acknowledges the inherent complexity and residual uncertainty of Natural Capital approaches; therefore, the tool outcomes are indicative and are based mainly on published evidence and expert knowledge. The tool provides an additional evidence source to inform decisions. Therefore, within the study the results have be sense-checked and interpreted to provide consistency.
- As discussed in Section A4-1.2, extremely minor edits were made to the Proposed Scheme boundary during finalisation of the EIAR (totalling less than 0.1 ha collectively across the Proposed Scheme), but these have not been taken into account in area calculations provided in the BNG and Natural Capital assessments. Also, minor edits were made to the enhancement site boundary for Site 1, but these were not considered to have implications for the BNG or the Natural Capital calculations.

Natural Capital Results

Proposed Scheme

A4-1.3.18. The Proposed Scheme presents a slight increase of "developed land, sealed surface" and a reduction in "built linear features". In terms of habitats, the main changes are the increase of "other neutral grassland" and the creation of "other broadleaved woodland". It also proposes the removal of "bramble scrub", "mixed scrub", "upland calcareous grassland" and "temporary grass and clover leys".

A4-1.3.19. A summary of the results from the Natural Capital (NATURE Tool) analysis is shown in Plate A4-1.2. The Proposed Scheme results in an increase in the

Natural Capital Score of +2, representing a +5% Change Score. The overall Cultural & Health ecosystem services present gains of +10%. However, the regulating & supporting and the provisioning ecosystem services get losses of -2% and -2%, respectively.

A4-1.3.20. In terms of cultural & health ecosystem services, all the ecosystem services show gains. The most significant increase is in recreation (+19%) and sense of place (+16%). The other ecosystem services in this category have an increase between 5% to 10%. The Cultural & Health gains are mainly due to the implementation of “other neutral grassland”, which has a better or equal performance in all the Cultural & Health ecosystem services compared to the baseline habitats that have been removed. Also, the Proposed Scheme has some level of accessibility due to the OMR and other footpaths that cross the area, which would not be changed in the post-development phase. Accessibility is an important factor within the Cultural & Health ecosystem services to allow people to enjoy the post-development enhancements.

A4-1.3.21. For regulating & supporting ecosystem services, adverse outcomes for most ecosystem services are indicated. The main loss is in carbon storage (-21%), which resulted from “upland flushes, fens & swamps” reduction, which has a significantly better carbon storage performance than the other baseline or post-development habitats. Only pollination (+11%) and pest control (+4%) present positive outcomes due to the implementation of “neutral grassland”.

A4-1.3.22. The provisioning ecosystem services presents a deficit in water availability (-3%). However, no changes are expected regarding community and commercial food and fishing provisioning and wood production, which are currently not detected in the area.

Plate A4-1.2 – Proposed Scheme NATURE Tool results

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SUMMARY RESULTS FOR ADVANCED CHANGE ASSESSMENT - PROJECTION

A83 MTS

Post development

Priorities Defined By 0 | Assessment By AtkinsRealis & WSP

NATURAL CAPITAL

Services & Benefits	Baseline Units/ Score	Project Units/ Score	Unit/ Score Change	Change Score	Confidence Rating	Policy Priority
Natural Capital Score	43	45	+2	+5%		
Cultural & Health	64	71	+7	+10%		
Mental Health	53	58	+5	+10%		M
Physical Health	31	34	+3	+8%		M
Aesthetic Values	98	106	+8	+8%		H
Education & Knowledge	72	77	+5	+7%		M
Interaction with Nature	77	82	+4	+5%		M
Recreation	28	33	+5	+19%		H
Sense of Place	83	96	+13	+16%		H
Regulating & Supporting	32	31	-1	-2%		
Air Quality Regulation	3	2	-0	-15%		M
Carbon Storage	5	4	-1	-21%		H
Cooling & Shading	5	4	-1	-17%		L
Erosion Protection	72	71	-1	-1%		H
Flood Regulation	35	32	-3	-8%		M
Water Quality Regulation	33	30	-3	-8%		H
Pest Control	50	52	+2	+4%		L
Pollination	43	47	+5	+11%		M
Provisioning	10	10	-0	-2%		
Food & Fish | Commercial	0	0	0	0%		L
Food & Fish | Community	0	0	0	0%		L
Water Availability	50	49	-1	-3%		L
Wood Production	0	0	0	0%		M

Site 1

A4-1.3.23. Section A4-1.2 describes the baseline and post development of Site 1. The main planned habitat changes are the removal of “other coniferous woodland” to implement “other broadleaved woodland”, and the removal of “bracken” to increase the “upland heathland” area. The other baseline habitats, including “mixed scrub”, “upland acid grassland”, “upland heathland”, “purple moor grass and rush pastures”, “upland flushes, fens and swamps” and “other rivers and streams” would be retained or enhanced.

A4-1.3.24. A summary of the results from the Natural Capital (NATURE Tool) analysis is shown in Plate A4-1.3. The enhancement proposal for Site 1 would result in an increase in the Natural Capital Score from 35 to 38, which represent a +9% Change Score. The overall Cultural & Health and regulating & supporting ecosystem services would present gains of +10% and +12% respectively. However, the provisioning ecosystem services would present a deficit of -37%.

A4-1.3.25. The ecosystem services with more gains are pollination (+44%), carbon storage (+26%), water quality regulation (+19%) and sense of place (+13%). The implementation of broadleaved woodland has a positive impact in all the mentioned ecosystem services. Furthermore, the new broadleaved woodland is not planned to be used for forestry production in the manner of the existing coniferous plantation and therefore would not have a felling rotation. This means that the woodland can mature further than in the commercially managed coniferous woodland where the level of ecosystem services provision is reduced each time after felling, only slowly building up again when the next rotation matures.

A4-1.3.26. Meanwhile, wood production has the highest deficit with -100%. This is a consequence of removing coniferous woodland plantation. No wood production is expected in the area post-intervention.

A4-1.5.1. Recreation and education & knowledge do not show any changes, since no accessibility improvements (e.g. footpaths) or educational visits have been proposed. Similarly, no changes are expected regarding community and commercial food and fishing provisioning.

Plate A4-1.3 – Site 1 NATURE Tool results

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SUMMARY RESULTS FOR ADVANCED CHANGE ASSESSMENT - PROJECTION

A83 Enhancement Site 1-MTS

Post development

Priorities Defined By 0 | Assessment By AtkinsRealis & WSP

	Services & Benefits	Baseline Units/ Score	Project Units/ Score	Unit/ Score Change	Change Score	Confidence Rating	Policy Priority
NATURAL CAPITAL	**Natural Capital Score**	35	38	+3	+9%		
	Cultural & Health	29	32	+3	+10%		
	Mental Health	22	24	+2	+11%		M
	Physical Health	16	17	+1	+4%		M
	Aesthetic Values	46	50	+4	+9%		H
	Education & Knowledge	0	0	0	0%		M
	Interaction with Nature	27	29	+2	+9%		M
	Recreation	0	0	0	0%		H
	Sense of Place	74	84	+10	+13%		H
	Regulating & Supporting	40	45	+5	+12%		
	Air Quality Regulation	9	6	-2	-28%		M
	Carbon Storage	15	19	+4	+26%		H
	Cooling & Shading	8	8	+1	+9%		L
	Erosion Protection	79	87	+8	+11%		H
	Flood Regulation	64	62	-2	-3%		M
	Water Quality Regulation	48	57	+9	+19%		H
	Pest Control	44	46	+3	+6%		L
	Pollination	31	44	+13	+44%		M
	Provisioning	19	12	-7	-37%		
	Food & Fish | Commercial	0	0	0	0%		L
	Food & Fish | Community	0	0	0	0%		L
	Water Availability	50	47	-3	-6%		L
	Wood Production	25	0	-25	-100%		L

Site 3a

A4-1.3.27. Section A4-1.2 describes the baseline and post development of Site 3a. The main planned habitat changes are removal of “coniferous woodland”, and the addition of "broadleaved woodland” (accounting “individual rural trees” as “broadleaved woodland and stated in Section A4-1.3, Limitations). The other baseline habitats, including “other neutral grassland”, “purple moor grass and rush pastures”, “upland flushes, fens and swamps” and “rivers” are planned to be retained or enhanced. Scattered broadleaved trees are planned to be added within these habitats and along the riparian corridor.

A4-1.3.28. A summary of the results from the Natural Capital (NATURE Tool) analysis is shown in Plate A4-1.4. The enhancement proposal for Site 3a results in a minimal increase in the Natural Capital Score from 14 to 15, which represents a +4% Change Score. The overall regulating & supporting ecosystem services present gains of +5%. However, the provisioning ecosystem services present a deficit of -9%. Cultural & health ecosystems services have marginal gains of 1% for the post-development proposal.

A4-1.3.29. The regulating and supporting ecosystem services with the most gains are carbon storage (+71%), air quality regulation (+36%), cooling and shading (+17%) and flood regulation (+9%). The implementation of broadleaved woodland positively impacts in the provision of these ecosystem services because, despite the removal of existing coniferous woodland, the new broadleaved woodland would have a bigger extent, five times more than current tree coverage. Similar to Site 1, the new broadleaved woodland would not be used for forestry production like the old coniferous forest and therefore would not have a felling rotation, which will allow the woodland to mature further than in the commercially managed coniferous woodland.

A4-1.3.30. Similar to Site 1, wood production has the highest deficit with -100%. This is a consequence of removing coniferous woodland plantation in favour of other broadleaved woodland. In the post development, no wood production is expected in the area.

A4-1.3.31. No changes are expected in ecosystem services such as mental health, education & knowledge, interaction with nature, recreation, pest control and community and commercial food and fishing provisioning.

Plate A4-1.4– Site 3a NATURE Tool results

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SUMMARY RESULTS FOR ADVANCED CHANGE ASSESSMENT - PROJECTION

A83 Enhancement Site 3a

Priorities Defined By 0 | Assessment By AtkinsRealis & WSP

	Services & Benefits	Baseline Units/ Score	Project Units/ Score	Unit/ Score Change	Change Score	Confidence Rating	Policy Priority
NATURAL CAPITAL	**Natural Capital Score**	14	15	+1	+4%		
	Cultural & Health	12	12	+0	+1%		
	Mental Health	8	8	0	0%		L
	Physical Health	5	6	+0	+6%		L
	Aesthetic Values	7	7	+0	+1%		H
	Education & Knowledge	0	0	0	0%		L
	Interaction with Nature	10	10	0	0%		L
	Recreation	0	0	0	0%		L
	Sense of Place	29	29	+0	+1%		H
	Regulating & Supporting	17	17	+1	+5%		
	Air Quality Regulation	1	2	+0	+36%		M
	Carbon Storage	2	4	+2	+71%		H
	Cooling & Shading	1	1	+0	+17%		L
	Erosion Protection	33	34	+1	+3%		H
	Flood Regulation	24	26	+2	+9%		M
	Water Quality Regulation	24	25	+1	+3%		H
	Pest Control	22	22	+0	0%		L
	Pollination	16	17	+1	+5%		M
	Provisioning	8	7	-1	-9%		
	Food & Fish | Commercial	0	0	0	0%		L
	Food & Fish | Community	0	0	0	0%		L
	Water Availability	29	27	-2	-7%		L
	Wood Production	1	0	-1	-100%		L

Natural Capital Aggregated Score

A4-1.3.32. Plate A4-1.5 shows the aggregated score for the Proposed Scheme as well as the enhancement sites. The overall total change in natural capital score is +13%.

A4-1.3.33. The main gains are in the regulating & supporting ecosystem services, with an overall score of +16%. In this category, carbon storage (+79%), pollination (+44%) and water quality regulation (+21%) have the highest increases. Cultural & Health ecosystem services also present gains, with +15% overall. Sense of place (+27%) and recreation (+19%), mental health (+15%) and aesthetic value (+12%) have the main gains within the Regulation and Supporting ecosystem services.

A4-1.3.34. In contrast, provisioning ecosystem services results in a negative output (-16%). This is mainly due to the change of coniferous woodland currently used for wood production into broadleaved woodland, which negatively impacts the wood production score (-100%). Water availability also presents a negative output (-12%).

A4-1.3.35. However, all of the Proposed Scheme's high-priority ecosystem services (i.e. aesthetic value, recreation, sense of place, carbon storage, erosion protection and water quality regulation) result in gains.

A4-1.3.36. Also, notably, all high-priority Cultural and Health ecosystem services achieve an on-site net gain. This is relevant because these services are usually realised locally.

A4-1.3.37. In terms of the high-priority regulating & supporting ecosystem services, they all present on-site net loss. Nevertheless, the enhancement sites support the delivery of gains in all cases. This shows the importance of including offsite enhancements within the Proposed Scheme. In the case of erosion protection, changes on-site present negative outputs.

A4-1.3.38. The priorities are based on the Proposed Scheme priorities. However, all High FLS priorities are also High priorities for the Proposed Scheme (see Annex 4.1.D).

Plate A4-1.5– Proposed Scheme Aggregated NATURE Tool results

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SUMMARY RESULTS FOR ADVANCED CHANGE ASSESSMENT - PROJECTION

A83 MTS Aggregated Results

Assessment By AtkinsRealis & WSP

Services & Benefits	On-Site Baseline	On-Site Unit Change	Offset Unit Change	Total Change From On-Site Baseline	Confidence Rating	Policy Priority	Objectives Met?
Natural Capital Score	43	+2	+4	+13%	●		✓
Cultural & Health	64	+7	+3	+15%	●		N/A
Mental Health	53	+5	+2	+15%	●	M	N/A
Physical Health	31	+3	+1	+11%	●	M	N/A
Aesthetic Values	98	+8	+4	+12%	●	H	✓
Education & Knowledge	72	+5	0	+7%	●	M	N/A
Interaction with Nature	77	+4	+2	+8%	●	M	N/A
Recreation	28	+5	0	+19%	●	H	✓
Sense of Place	83	+13	+10	+27%	●	H	✓
Regulating & Supporting	32	-1	+6	+16%	●		N/A
Air Quality Regulation	3	-0	-2	-89%	●	M	N/A
Carbon Storage	5	-1	+5	+79%	●	H	✓
Cooling & Shading	5	-1	+1	-2%	●	L	N/A
Erosion Protection	72	-1	+9	+12%	●	H	✓
Flood Regulation	35	-3	+0	-8%	●	M	N/A
Water Quality Regulation	33	-3	+10	+21%	●	H	✓
Pest Control	50	+2	+3	+9%	●	L	N/A
Pollination	43	+5	+14	+44%	●	M	N/A
Provisioning	10	-0	-8	-78%	●		N/A
Food & Fish | Commercial	0	0	0	0%	●	L	N/A
Food & Fish | Community	0	0	0	0%	●	L	N/A
Water Availability	50	-1	-5	-12%	●	L	N/A
Wood Production	0	0	-26	-100%	●	M	N/A

A4-1.4. Discussion and Conclusions

Terrestrial BNG

A4-1.4.1. The changes to terrestrial habitat as a result of the Proposed Scheme would result in a 21.40% loss in HU. By also undertaking the proposed habitat enhancements and habitat creation within the two Enhancement Sites, overall, a clear biodiversity enhancement would be achieved. A 5.32% gain is predicted, thus meeting with the requirements of NPF4 Policies 3a, 3c and 3d. Table A4-1-16 provides a summary of the BNG terrestrial assessment. It should be noted that the results are an assessment of predicted outcomes based on the information available and do not themselves constitute a target for the Proposed Scheme to meet.

A4-1.4.2. The Proposed Scheme baseline habitats (excluding developed land) cover an area of 6.97ha, with 6.35ha of habitat creation proposed post development. The proposed enhancement sites cover two locations totalling 11.38ha, which given the scale of the Proposed Scheme are considered to provide a significant level of enhancement. The key habitat to be created is woodland, which aligns with the LLTNP Trees and Woodland Strategy strategic objective of increasing woodland cover and improving woodland condition within the national park, noting that in Site 1 woodland condition will be improved through the change of non-native coniferous woodland to native broadleaved woodland and scattered tree planting along the riparian corridor in Site 3a.

A4-1.4.3. It is also noted, however, that within the Metric, despite the gain in HU, the trading rules of the Metric are not met fully. The trading rules work on the principle of providing habitats to offset losses, based on the same broad habitat type which has been lost and providing habitats of at least the same distinctiveness value or higher. Within the Proposed Scheme, the key losses for which the trading rules are not satisfied are with respect to wetland - fens (upland and lowland), where 35.13 units would be lost. This habitat type is valued in the metric as a very high distinctiveness habitat. Where these habitats are to be lost, the landscaping includes a wet grassland mix, to be seeded alongside each of the watercourses which run between the A83 and the Proposed Scheme.

A4-1.4.4. This wet grassland mix will contain a number of species associated with wetland – fen habitat currently present. However, a precautionary approach has been taken in assigning the post development habitat type in the metric. The area of wet grassland to be created has been entered as neutral grassland, rather than wetland-fen, as the difficulty in creating this fen is acknowledged and it is considered more likely that wet (neutral) grassland can be achieved.

A4-1.4.5. On review of the UKHab definitions, neutral grassland can include grasslands that are periodically inundated with water or permanently moist. The seed mix to be used will include species appropriate to the location, which were also recorded during the baseline surveys, including common sorrel, devil's bit scabious and marsh thistle. This means that while the created habitat is assumed to be neutral grassland, in practice a habitat mosaic should form that supports similar features and species to the fen habitat to be lost, so similar ecological niches will be provided.

A4-1.4.6. Given this, whilst the trading rules indicate an overall loss of wetland-fen habitat, it is considered that the proposed wet grassland mix does provide a degree of compensation for this loss, noting that the loss of wetland-fens (upland and lowland), is a unit loss of 35.13 HU (1.39ha) from within the Proposed Scheme (and an area loss of 1.39ha), while 1.13ha of wet grassland is proposed which equates to 10.54 HU.

A4-1.4.7. The trading rules are also not satisfied with respect to losses of small areas of bramble and mixed scrub. The areas affected are very small, 0.3ha (1.38 HU's) and 0.06ha (0.83 HU's) respectively. However, the scattered trees to be provided, provide the same total number of HU's (2.21), the species mix will include common hawthorn, blackthorn and goat willow and as such will provide a similar ecological function to the areas of scrub which will be lost.

A4-1.4.8. The trading rules are also not satisfied with respect to losses of small areas of upland calcareous grassland and upland heathland. An area of 0.1ha (1.1% of the baseline habitats) of upland calcareous grassland and 0.23 of upland heathland (2.6% of the baseline habitats) will be lost. However, taking account for the small size of these areas affected, combined with the overall increase

in HU achieved, it is considered the Proposed Scheme still provides clear biodiversity enhancements.

Table A4-1-16 – Summary Predicted Habitat Units (HU's)

Proposed Scheme Baseline HUs	Proposed Scheme Post Development HUs	Predicted % change - Proposed Scheme only	HUs Achievable through Enhancement Sites	Overall Percentage change for Proposed Scheme, plus Enhancement Sites - HU
84.64	66.52	-21.40%	Site 1: +17.21 Site 3a: +5.41 Total +22.62	+4.50 +5.32%

A4-1.4.9. A Habitat Creation and Management Plan (HCMP) will be produced for the Enhancement Sites as part of the next stages of the project. This will provide details on the methods for undertaking the habitat creation and enhancement, as well as details on the required management to ensure the habitats reach the predicted condition. This document will also include any requirements to follow with respect to protected species to ensure any relevant legislation is adhered to. Species assessments of the Enhancement Sites have been prepared for the wider Long-Term Solution (LTS) which will be published and which encompass the OMR interventions. This, ecological information specific to the MTS will be provided to the successful contractor upon approval of the scheme and this information will be used to inform the HCMP.

Aquatic BNG

A4-1.4.10. Overall, the changes to aquatic habitats as a result of the Proposed Scheme will result in a 44.83% loss in WBU. By undertaking the proposed habitat enhancements and habitat creation within the two Enhancement Sites, a significant biodiversity enhancement will be provided, with a 14.06% gain predicted overall. Table A4-1-17 provides a summary of the BNG watercourse assessment. It should be noted that the results are an assessment of

predicted outcomes based on the information available and do not themselves constitute a target for the Proposed Scheme to meet.

A4-1.4.11. Watercourse units are predicted to be gained through riparian habitat enhancements that reflect positively within MoRPh survey and align with terrestrial ecology habitat enhancements. See Annex 4.1.A for a worked example of how such habitat changes are assumed to increase the condition of watercourses.

Table A4-1-17 – Summary Predicted Watercourse Biodiversity Units (WBUs)

Proposed Scheme Baseline WBU'S	Proposed Scheme Post Development WBU's	Predicted % change - Proposed Scheme only	WBUs Achievable through Enhancement Sites	Overall Percentage change for Proposed Scheme, plus Enhancement Sites – WBUs
19.13	10.55	-44.83%	Site 1: +3.76 Site 3a: +7.49 Total: +11.25	+14.06%

Natural capital

A4-1.4.12. The Natural Capital Assessment was done separately for the Proposed Scheme and the two enhancement sites. These scores were then aggregated and summarised in Table A4-1-18 to present an overall score change. It should be noted that the results are an assessment of predicted outcomes based on the information available and do not themselves constitute targets for the Proposed Scheme to meet.

A4-1.4.13. The Proposed Scheme Natural Capital score is predicted to result in a gain of 5% for the on-site proposal. However, the enhancement sites will boost the Natural Capital scores in multiple ecosystem services, which will achieve more gains and meet the Proposed Scheme's objectives. Overall, with the enhancement sites, the Natural Capital score improves by 13% compared to the baseline. This is largely a function of the habitat improvements proposed for the enhancement sites, in particular, the removal of coniferous woodland

and bracken and replacement with broadleaved woodland. Moreover, the Proposed Scheme increase of other neutral grassland will provide important on-site gains.

A4-1.4.14. Furthermore, all the high-priority ecosystem services scoped for the Proposed Scheme will result in gains. Boosting the area of broadleaved woodland in the enhancement sites has positive impacts on most of the ecosystem services assessed, given that the woodland can mature further than in the commercially managed coniferous woodland where the level of ecosystem services provision is reduced each time after felling, only slowly building up again when the next rotation matures. Improvements were noted particularly in the regulating & supporting category, such as carbon storage, erosion protection and water quality regulation. Increasing broadleaved woodland also boosts the scores in the cultural & health category, particularly sense of place, aesthetic values, interaction with nature and physical and mental health.

A4-1.4.15. There were negative impacts to the provisioning ecosystem services due to the loss of coniferous woodland managed for timber, which represents a loss of wood production. However, this is not a priority ecosystem service for the Proposed Scheme.

Table A4-1-18 – Summary Predicted Natural Capital Units

Proposed Scheme Baseline Natural Capital score	Proposed Scheme Post Development Natural Capital score	Predicted % change - Proposed Scheme only	Natural Capital score Achievable through the Enhancement Sites	Overall Natural Capital percentage change for Proposed Scheme plus enhancement sites
43	45	+5%	Site 1: +9% Site 3a: +4%	+13%

Conclusion

A4-1.4.16. The Proposed Scheme objective for the environment is “Protect the environment, including the benefits local communities and visitors obtain from the natural environment, by enhancing Natural Capital assets and ecosystem service provision through delivery of sustainable transport infrastructure.”

A4-1.4.17. This report has demonstrated through the BNG and Natural Capital assessments that the landscape mitigation design for the Proposed Scheme, along with the additional offsite habitat creation and enhancements, would comply with the biodiversity and Natural Capital policy requirements and environment objective (as outlined in Section A4-1.1). Both assessments demonstrate positive gains meaning that benefits can be achieved, and clear biodiversity enhancement will be provided.

Annexes

Annex 4.1.A. Baseline Watercourse Condition: MTS and Enhancement Sites

A4.1.A.1. Introduction

A4.1.A.1.1. With the exception of the Croe Water and the High Glen Croe Tributary, all watercourses within the study area, including Enhancement Sites, are relatively small upland headwater/minor tributary systems. It can be difficult to define discrete watercourses within these systems due to the presence of bifurcations and multiple sub-tributaries.

A4.1.A.1.2. Initial walkover surveys confirmed that broad typology (for example, river size, gradient, bedform, modification and riparian land use) was consistent throughout the minor tributaries within the study area. Consequently, a stratified sampling approach for field survey was adopted for such watercourses, with river MoRPh surveys undertaken on a representative 15 watercourses within the proposed Scheme Boundary (see Table A4-1-19). This includes the Croe Water eastern bifurcation, which shares its typology with other minor tributaries in the study area. All such river MoRPh surveys undertaken identified the same river habitat typology under MoRPh definitions, substantiating the stratified survey approach, and a range of river MoRPh condition from Fairly Poor to Fairly Good. In addition, a representative 7 MoRPh surveys were undertaken across Enhancement Sites 1 and 3a (see Table A4-1-20), where a range of river typology was apparent, as well as a range of condition from Moderate to Fairly Good.

A4.1.A.1.3. Negative MoRPh indicators are predominantly associated with reduced riparian habitat complexity and limited riparian and in-channel wooded features normally associated with tree cover, the absence of which is a legacy of agricultural land use. Outside of the MoRPh survey extents (which were located on open watercourse extents), other river modifications are associated with the A83 and Old Military Road (culverts and headwalls).

Table A4-1-19 – River condition assessment summary (watercourses within the MTS)

Watercourse ID	Survey Location NGR - midpoint of MoRPh survey)	Date of Survey	Habitat (River Type)	Final River Condition
Croe Water A83_ML_015_000	NN 24157 05997	29/11/2023	C - Straight/sinuous to step-pool, coarsest BO/BE, average CO	Fairly Good
Tributary of Croe A83_ML_017_000	NN 24102 06198	29/11/2023	C - Straight/sinuous to step-pool, coarsest BO/BE, average CO	Moderate
Tributary of Croe A83_ML_018_000	NN 24015 06357	29/11/2023	C - Straight/sinuous to step-pool, coarsest BO/BE, average CO	Moderate
Tributary of Croe A83_ML_019_000	NN 23936 06482	28/11/2023	C - Straight/sinuous to step-pool, coarsest BO/BE, average CO	Moderate
Tributary of Croe A83_ML_021_000	NN 23893 06551	28/11/2023	C - Straight/sinuous to step-pool, coarsest BO/BE, average CO	Fairly Poor*
Tributary of Croe A83_ML_023_000	NN 23786 06715	28/11/2023	C - Straight/sinuous to step-pool, coarsest	Moderate*

Watercourse ID	Survey Location NGR - midpoint of MoRPh survey)	Date of Survey	Habitat (River Type)	Final River Condition
			BO/BE, average CO	
Tributary of Croe A83_ML_024_000	NN 23752 06809	28/11/2023	C - Straight/sinuous to step-pool, coarsest BO/BE, average CO	Fairly Poor*
Tributary of Croe A83_ML_025_000	NN 23668 06909	27/11/2023	C - Straight/sinuous to step-pool, coarsest BO/BE, average CO	Moderate*
Tributary of Croe A83_ML_026_B01	NN 23594 06953	27/11/2023	C - Straight/sinuous to step-pool, coarsest BO/BE, average CO	Fairly Poor*
Tributary of Croe A83_ML_027_000	NN 23534 07065	27/11/2023	C - Straight/sinuous to step-pool, coarsest BO/BE, average CO	Moderate
Tributary of Croe A83_028_000_000	NN 23493 07107	27/11/2023	C - Straight/sinuous to step-pool, coarsest BO/BE, average CO	Moderate
Tributary of Croe A83_ML_029_000	NN 23439 07188	27/11/2023	C - Straight/sinuous to step-pool,	Moderate

Watercourse ID	Survey Location NGR - midpoint of MoRPh survey)	Date of Survey	Habitat (River Type)	Final River Condition
			coarsest BO/BE, average CO	
Tributary of Croe A83_ML_030_000	NN 23399 07254	27/11/2023	C - Straight/sinuous to step-pool, coarsest BO/BE, average CO	Fairly Poor
Tributary of Croe A83_ML_031_000	NN 23361 07293	27/11/2023	C - Straight/sinuous to step-pool, coarsest BO/BE, average CO	Moderate
Tributary of Croe A83_032_000_000	NN 23265 07309	27/11/2023	C - Straight/sinuous to step-pool, coarsest BO/BE, average CO	Moderate

Table Note: Final Condition Score within five watercourses (*) downgraded by one condition class to account for excessive scour from upstream culvert jetting as per RCA guidance.

Table A4-1-20 – River condition assessment summary (watercourses within Enhancement Sites)

Watercourse ID	Survey Location NGR -midpoint of MoRPh survey)	Date of Survey	Habitat (River Type)	Final River Condition
Trib of High Glen Croe Tributary (Enhancement Site 1) A83_LF_050_000	NN 22881 06976	18/06/2024	D - Straight/sinuous to plane bed, coarsest BO/BE, average GP	Fairly Good
Trib of High Glen Croe Tributary (Enhancement Site 1) A83_LF_050_000	NN 23020 07021	18/06/2024	D - Straight/sinuous to plane bed, coarsest BO/BE, average GP	Fairly Good
Trib of High Glen Croe Tributary (Enhancement Site 1) A83_LF_050_000	NN 23148 06987	18/06/2024	D - Straight/sinuous to plane bed, coarsest BO/BE, average GP	Fairly Good
High Glen Croe Tributary (Enhancement Site 3a)	NN 23632 06506	27/03/2024	F - Straight/sinuous, coarsest CO, average GP	Fairly Good
High Glen Croe Tributary	NN 23750 06358	27/03/2024	F - Straight/sinuous	Fairly Good

Watercourse ID	Survey Location NGR -midpoint of MoRPh survey)	Date of Survey	Habitat (River Type)	Final River Condition
(Enhancement Site 3a)			, coarsest CO, average GP	
High Glen Croe Tributary (Enhancement Site 3a)	NN 23842 06198	18/06/2024	F - Straight/sinuous, coarsest CO, average GP	Moderate
High Glen Croe Tributary (Enhancement Site 3a)	NN 23877 06025	18/06/2024	F - Straight/sinuous, coarsest CO, average GP	Moderate

Annex 4.1.B. Pre and Post Enhancement Watercourse MoRPh Indicator Scores

A4.1.B.1. Pre- and Post- Enhancement Watercourse MoRPh Indicator Scores

A4.1.B.1.1. Based on proposed enhancements within each identified Enhancement Site, MoRPh scoring indicators recorded under the existing baseline have been assumed to change for several indicators that underpin overall condition classification.

A4.1.B.1.2. An example of this approach is provided in Table A4-1-21, for the High Glen Croe Tributary. Based on the enhancements set out for the riparian corridor associated with this watercourse, MoRPh indicators have been artificially adjusted to reflect a likely change in scoring, relative to the existing baseline. In this example, two post-enhancement scenarios are shown:

- 2 years post-enhancement scenario - based on standard time to target condition for watercourses, for movement from Fairly Good to Good Condition within the Metric and
- 15 years post-enhancement scenario - based on adopting a typical woodland establishment time to target condition within the Metric, aligning with the terrestrial approach and acknowledging that the proposed enhancements of the riparian corridor will take time to establish. At least to the extent that associated MoRPh indicators (for example, bank top and bank face vegetation and riparian structure and tree feature richness) are significantly improved relative to the existing baseline).

A4.1.B.1.3. The metrics and net change reported within this BNG assessment for watercourses are, on a precautionary basis, predicated on the 15 years post-enhancement scenario. This has been represented as a delay in watercourse enhancement within the Metric, as discussed within the assumptions section of this report.

A4.1.B.1.4. Condition classification thresholds within the Metric vary by watercourse typology. In this example, High Glen Croe Tributary (River Type F) requires a

minimum provisional condition score of 2.3 in order to attain Good condition, which is shown to be achieved under the 15 years post-enhancement scenario. Full details of indicator definitions, scoring approaches and condition type thresholds are included within A Guide to Assessing River Condition.

Table A4-1-21 – Example Pre- and Post- Enhancement MoRPh Indicator Scores (High Glen Croe Tributary MoRPh, MoRPH River Type F)

River Condition Indicator	Code	Baseline	2 Years Post Enhancement	15 Years Post Enhancement
Bank top vegetation structure	B1	3	3	4
Bank top tree feature richness	B2	0	1	4
Bank top water-related features	B3	2	2	2
Bank top NNIPS cover	*B4*	0	0	0
Bank top managed ground cover	*B5*	-1	0	0
Bank face riparian vegetation structure	C1	2	2	3
Bank face tree feature richness	C2	1	1	2
Bank face natural bank profile extent	C3	3	3	3
Bank face natural bank profile richness	C4	4	4	4
Bank face natural bank material richness	C5	2	2	2
Bank face bare sediment extent	C6	4	4	4
Bank face artificial bank profile extent	*C7*	0	0	0
Bank face reinforcement extent	*C8*	0	0	0
Bank face reinforcement material severity	*C9*	0	0	0
Bank face NNIPS cover	*C10*	0	0	0
Channel margin aquatic vegetation extent	D1	1	1	1
Channel margin aquatic morphotype richness	D2	1	1	1
Channel margin physical feature extent	D3	3	3	3
Channel margin physical feature richness	D4	3	3	3
Channel margin artificial features	*D5*	0	0	0
Channel aquatic morphotype richness	E1	1	1	1
Channel bed tree features richness	E2	0	2	4
Channel bed hydraulic features richness	E3	2	2	2
Channel bed natural features extent	E4	3	3	3
Channel bed natural features richness	E5	2	2	2
Channel bed material richness	E6	2	2	2

River Condition Indicator	Code	Baseline	2 Years Post Enhancement	15 Years Post Enhancement
Channel bed siltation	*E7*	0	0	0
Channel bed reinforcement extent	*E8*	0	0	0
Channel bed reinforcement severity	*E9*	0	0	0
Channel bed artificial features severity	*E10*	0	0	0
Channel bed NNIPS extent	*E11*	0	0	0
Channel bed filamentous algae extent	*E12*	0	0	0
Average of positive scores	NA	2.05	2.21	2.63
Average of negative scores	NA	-0.08	0.00	0.00
Provisional condition score	NA	1.98	2.21	2.63
Condition Class	NA	FAIRLY GOOD	FAIRLY GOOD	GOOD

Table Note: NNIPS = non-native invasive plant species, positive indicators in green non-italic, negative indicators in red italic. Green shaded cells indicate an assumed score/condition change under the post-enhancement scenario.

Annex 4.1.C. NATURE Tool Glossary

A4.1.C.1. Indicator Key (Columns)

Baseline Units/Scores

A4.1.C.1.1. This indicator provides an indication of the natural capital (biodiversity) performance of the site in its baseline state over the assessment period. This is effectively the business-as-usual scenario assuming the site remains unchanged.

A4.1.C.1.2. The scores for natural capital are commonly based on base scores for each habitat type present. The base scores also depend on habitat maturity which is factored in. The base scores indicate the general level of ecosystem service provision by that habitat. The base scores are then adjusted based on multipliers in relation to indicators for ecosystem location and condition. A habitat receives for example a higher Recreation score if the habitat has good access. Please refer to the Detailed Results sheet for more information on how scores are calculated.

A4.1.C.1.3. For biodiversity, units are commonly calculated with the Biodiversity Metric 3.1 with results being imported into the NATURE Tool so that results can be displayed alongside natural capital.

A4.1.C.1.4. In a change assessment, the baseline scores (units) are used as baseline against which project impacts are assessed and directly inform the Change Score.

Project Units/Score

A4.1.C.1.5. This indicator provides an indication of the natural capital (biodiversity) performance of the site in its proposed future state. It is based on the scores (units) indicated for the post-development state of the site but also takes the natural capital performance during the construction phase into account (where applicable).

A4.1.C.1.6. The scores for natural capital are commonly based on base scores for each habitat type present. The base scores also depend on habitat maturity. The

base scores indicate the general level of ecosystem service provision by that habitat. The base scores are then adjusted based on multipliers in relation to indicators for ecosystem location and condition. A habitat receives for example a higher Recreation score if the habitat has good access. For the project scores, habitat delivery risks are also accounted for which may reduce the score for certain habitats compared to already established habitats of the same type.

A4.1.C.1.7. The project scores (units) are compared against the baseline to inform the Unit/Score Change and subsequently the Change Score.

Unit/Score Change

A4.1.C.1.8. The score (unit) change indicates the impact of the project on the score (units) for each service/benefit. The score (unit) change is calculated by subtracting the 'Baseline Units/Score' from the 'Project Units/Score'.

Change Score

A4.1.C.1.9. This is the main indicator for measuring project success in terms of natural capital (biodiversity) impact. For each assessed ecosystem service and benefit, the Change Score indicates the percentage change against the baseline. A Change Score of +30%, for example, indicates that the service provision would be 30% higher than it would have been if the baseline state of the site remained in place. If the Change Score is greater than +100%, it will simply be displayed as >100%. A positive Change Score generally indicates a positive impact on natural capital (biodiversity). The higher the Change Score, the greater the indicative ecosystem service/benefit. The Change Score is calculated by dividing the 'Unit/Score Change' by the 'Baseline Units/Score'.

Confidence Rating

A4.1.C.1.10. The Confidence Rating indicates the general confidence in the scores and units calculated. It is mainly provided for transparency and considers general model uncertainties and caveats such as how well the model reflects the complexity of the ecosystem service/benefit and the evidence base informing scores and multipliers.

A4.1.C.1.11. The fixed Confidence Rating is based on the assumption that the highest habitat detail level and all relevant advanced indicators are utilised. The Confidence Rating can be High (Green), Medium (Yellow), Low (Orange) or Experimental (Red):

-  **High**: Very confident: There is a strong evidence base upon which to base scores across the range of habitats and multipliers used for the respective ecosystem service. Please note that this category is not currently applicable.
-  **Medium**: Reasonably confident: There is some suitable evidence to calibrate the range of scores across habitats and multipliers and/or scoring applied to a limited range of habitats/multipliers for which there is a sound and simple rationale.
-  **Low**: Low confidence: The relationship between the provision of the ecosystem service and habitats is complex. Evidence for scoring/multipliers is partial, although may be stronger for some habitats than others. Evidence gaps have been filled by consulting experts and with a degree of subjectivity, particularly for cultural services.
-  **Experimental**: An experimental approach which applies for aggregated benefit categories such as health benefits and the natural capital score. This category reflects the additional uncertainty and caveats attached to aggregated scores.

Policy Priority

A4.1.C.1.12. This indicator informs how scores are aggregated for the Natural Capital Score, cultural & health score, regulating & supporting score and provisioning score, respectively. They are mainly displayed for reference and transparency. By default, policy priorities are based on a literature review where relevant national environmental and planning policies were reviewed for each UK jurisdiction. The policy priority for each service and benefit can either be high, medium or low. This classification should be based on both the frequency of policies related to a service/benefit as well as how strong the wording is formulated.

A4.1.C.1.13. Policy Priorities translate into aggregation weights as follows:

- High (H) = 3
- Medium (M) = 2
- Low (L) = 1

A4.1.C.1.14. As a result, an ecosystem services/benefit score with a high policy priority is weighted 3 times as much in the aggregated Natural Capital Score than the same score for a service/benefit with a policy priority weight of 1 (low).

A4.1.C.1.15. Please note that physical and mental health scores are aggregated scores based on a literature review (see below). That means that certain ecosystem services scores feed into the health scores which feed into the aggregated Natural Capital Score which would result in double-counting. To avoid the double-counting issue, any contribution of ecosystem services scores to the health scores is deducted from the ecosystem services scores when feeding into aggregated scores such as the Natural Capital Score. For more detail refer to the relevant section within the Detailed Results sheet.

A4.1.C.2. Benefit and Services (Category) Key (Rows)

Natural Capital Score

A4.1.C.2.1. This is an aggregated headline indicator. It indicates the overall natural capital performance of the project and is based on scores for all ecosystem services/benefits as well as the Policy Priorities. This is effectively based on a Multi Criteria Decision Analysis (MCDA) framework and does NOT represent the overall value change in natural capital performance. Hence, the indicative Natural Capital Score should be read and interpreted alongside the individual ecosystem services/benefit results (and objectives where applicable).

A4.1.C.2.2. The aggregated Natural Capital Score is calculated as the average of each ecosystem services/benefits score below, each multiplied by the aggregation weight attached to the respective Policy Priority (see Policy Priority for further detail). The abiotic Photovoltaic Carbon Impact is also considered when applying the Carbon Storage policy priority.

Cultural & Health (Category)

A4.1.C.2.3. The cultural & health score is an aggregated headline indicator. It indicates the overall Culture & Health performance of the project and is based on scores for all ecosystem services/benefits as well as the Policy Priorities within this category. This is effectively based on a Multi Criteria Decision Analysis (MCDA) framework and does NOT represent the overall value change in Culture & Health performance. Hence, the indicative Culture & Health score should be read and interpreted alongside the individual ecosystem services/benefit results within the category (and objectives where applicable).

A4.1.C.2.4. The aggregated culture & health score is calculated as the average of each ecosystem services/benefits score below, each multiplied by the aggregation weight attached to the respective Policy Priority (see Policy Priority for further detail).

Mental Health

A4.1.C.2.5. The Mental Health score is an indicative aggregated indicator. It effectively aggregates ecosystem services scores based on their indicative contribution to Mental Health. This only indicates the contribution by natural capital and not any other engineered assets such as the presence of a hospital.

A4.1.C.2.6. The Mental Health score is effectively based on a Multi Criteria Decision Analysis (MCDA). A percentage-contribution to Mental Health is allocated to each ecosystem service which adds up to 100% (the Mental Health score). The percentage allocation is based on a literature review exploring the links between ecosystem services and Mental Health. To avoid double-counting when aggregating (the already aggregated) Mental Health score to for example the Natural Capital Score, the percentage allocation is deducted from the ecosystem services again when aggregated to the Natural Capital Score.

Physical Health

A4.1.C.2.7. The Physical Health score is an indicative aggregated indicator. It effectively aggregates ecosystem services scores based on their indicative contribution to Physical Health. This only indicates the contribution by natural capital and not any other engineered assets such as the presence of a hospital.

A4.1.C.2.8. The Physical Health score is effectively based on a Multi Criteria Decision Analysis (MCDA). A percentage-contribution to Physical Health is allocated to each ecosystem service which adds up to 100% (the Mental Health score). The percentage allocation is based on a literature review exploring the links between ecosystem services and Physical Health. To avoid double-counting when aggregating (the already aggregated) Physical Health score to for example the Natural Capital Score, the percentage allocation is deducted from the ecosystem services again when aggregated to the Natural Capital Score.

Aesthetic Values

A4.1.C.2.9. The aesthetic value of nature is highly subjective and therefore difficult to reflect in a habitat-based scoring system which should be acknowledged when interpreting results. Different groups of society have different levels of appreciation for different natural settings and places. However, not valuing aesthetic and other cultural ecosystem services also means that they can be undermined in decision-making. It is important to stress, however, that this is only a broad indication of aesthetic value.

A4.1.C.2.10. The Aesthetic Values Score only considers nature/habitats and not the aesthetics of constructed features such as buildings or monuments. The score is purely habitat-based and does not consider wider landscape impacts such as the appropriateness of habitats within the landscape setting. Nor does the automatically calculated score consider the preferences of the local community.

A4.1.C.2.11. The Aesthetic Values Score is based on a habitat base score, as well as the following multipliers:

- Level of accessibility: The multiplier is higher for sites that have better public access as people are more likely to benefit if they can be physically present.
- Nature designations: The multiplier is higher dependent on whether the site has local, national or international nature designations.

- Population density/external visitor numbers: The multiplier is higher in areas with higher population density and/or which are frequently visited which indicates a higher demand/likelihood of exposure.
- Habitat maturity: The score is usually higher for mature habitats that have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure of creating the intended habitat is likely to reduce ecosystem services.

Education & Knowledge

A4.1.C.2.12. Alongside more theoretical environmental education in the classroom, frequent interaction with the natural environment can form a key element of acquiring ecological knowledge.

A4.1.C.2.13. The education & knowledge Score only considers informal interaction with/formal educational visits to nature/habitats. It does not consider for example classroom-based ecological education which means that the presence of a school building or education centre would not enhance the score.

A4.1.C.2.14. The education & knowledge Score is based on a habitat base score, as well as the following multipliers:

A4.1.C.2.15. Educational use: The multiplier is higher for areas that are specifically designed for educational purposes, areas that are located on primary school grounds and areas regularly visited for organised educational visits.

- Level of accessibility: The multiplier is higher for sites that have better public access as people are more likely to benefit if they can be physically present.
- Nature designations: The multiplier is higher based on whether the site has local, national or international nature designations.
- Population density/external visitor numbers: The multiplier is higher in areas with higher population density and/or frequently visited which indicates a higher demand/likelihood of exposure.

- Habitat maturity: The score is usually higher for mature habitats that have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure of creating the intended habitat is likely to reduce ecosystem services.

Interaction with Nature

A4.1.C.2.16. Interaction with nature refers to observing nature such as bird watching; either formally or informally. It also includes random encounters with wildlife and more generally feeling 'connected to nature'. To distinguish interaction with nature from recreation, for example, amenity grassland or a natural sports pitch may provide great recreational opportunities but it is unlikely to provide many opportunities to interact with nature.

A4.1.C.2.17. The Interaction with Nature Score is purely habitat-based and does not directly consider the presence of species. Nor does it consider species/habitat diversity across a site.

A4.1.C.2.18. The Interaction with Nature Score is based on a habitat base score, as well as the following multipliers:

- Level of accessibility: The multiplier is higher for sites that have better public access as people are more likely to benefit if they can be physically present.
- Nature designations: The multiplier is higher based on whether the site has local, national or international nature designations.
- Population density/external visitor numbers: The multiplier is higher in areas with higher population density and/or which are frequently visited which indicates a higher demand/likelihood of exposure.
- Habitat maturity: The score is usually higher for mature habitats that have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure of creating the intended habitat is likely to reduce ecosystem services.

Recreation

A4.1.C.2.19. The cultural ecosystem service recreation refers to greenspace that enables enjoyment, recovery from stress and the promotion of health. Accessible greenspace provides opportunities for a range of human activities such as walking, cycling, horse riding, climbing and informal relaxation. Recreational activities are known to increase individual wellbeing.

A4.1.C.2.20. The Recreation Score is based on a habitat base score, as well as the following multipliers:

- Level of accessibility: The multiplier is higher for sites that have better public access as people are more likely to benefit if they can be physically present. The Recreation Score is highly dependent on the level of accessibility and sites without any level of access receive a score of zero.
- Population density/external visitor numbers: The multiplier is higher in areas with higher population density and/or which are frequently visited which indicates a higher demand/likelihood of exposure.
- Habitat maturity: The score is usually higher for mature habitats that have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure of creating the intended habitat is likely to reduce ecosystem services.

Sense of Place

A4.1.C.2.21. Sense of place refers to the aspects of a place that make it special and distinctive. This includes historic features, personal reasons, but also natural features such as habitats. The NATURE Tool provides indicative scores for different habitat types.

A4.1.C.2.22. The Sense of Place Score is purely indicative and only captures a proportion of what gives a space sense of place. Not considered, for example, is how habitats fit into the local setting or interact with other features such as buildings, monuments or the landscape. It also doesn't consider any spiritual or religious meanings of a space to communities.

A4.1.C.2.23. The Sense of Place Score is based on a habitat base score, as well as the following multipliers:

- Level of accessibility: The multiplier is higher for sites that have better public access as people are more likely to benefit if they can be physically present.
- Nature designations: The multiplier is higher based on whether the site has local, national or international nature designations.
- Population density/external visitor numbers: The multiplier is higher in areas with higher population density and/or which are frequently visited which indicates a higher demand/likelihood of exposure.
- Habitat maturity: The score is usually higher for mature habitats that have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure of creating the intended habitat is likely to reduce ecosystem services.

Regulating & Supporting (Category)

A4.1.C.2.24. The regulating & supporting score is an aggregated headline indicator. It indicates the overall regulating & supporting performance of the project and is based on scores for all ecosystem services/benefits as well as the Policy Priorities within this category. This is effectively based on a Multi Criteria Decision Analysis (MCDA) framework and does NOT represent the overall value change in regulating & supporting performance. Hence, the indicative regulating & supporting score should be read and interpreted alongside the individual ecosystem services results within the category (and objectives where applicable).

A4.1.C.2.25. The aggregated regulating & supporting score is calculated as the average of each ecosystem services/benefits score below, each multiplied by the aggregation weight attached to the respective Policy Priority (see Policy Priority for further detail).

Air Quality Regulation

A4.1.C.2.26. Complex vegetation and especially trees usually have a positive effect on the regulation of air quality. This applies particularly to areas where pollution emissions are comparatively high. Trees and other vegetation absorb, through physical deposition as well as chemical reactions, deleterious pollution such as nitrogen dioxide; but also carbon monoxide, sulphur dioxide, ozone and fine particulates which are responsible for major illnesses such as respiratory ailments, heart disease and cancer.

A4.1.C.2.27. Please note that good project design is assumed such as not creating a canopy 'roof' over busy roads which could potentially worsen localised air quality.

A4.1.C.2.28. The Air Quality Regulation Score is based on a habitat base score, as well as the following multipliers:

- Population density/external visitor numbers: The multiplier is higher in areas with higher population density and/or which are frequently visited which indicates a higher demand/likelihood of exposure.
- Air Quality Management Area (AQMA): The multiplier is higher if a site is located in an area with an AQMA which indicates a higher demand for air quality regulation services.
- Habitat maturity: The score is usually higher for mature habitats that have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure of creating the intended habitat is likely to reduce ecosystem services.

Carbon Storage

A4.1.C.2.29. Carbon Storage in this context refers to natural carbon storage in vegetation and corresponding soils which makes an important contribution to mitigating climate change and reaching climate/net-zero targets. The photosynthetic activities of trees and other vegetation sequester carbon dioxide from the atmosphere and therefore act as a net carbon sink, especially when carbon is stored in corresponding soils. This score indicates (the project's impact on)

average carbon stocks in vegetation and corresponding soils. It is NOT the carbon sequestration as this would not appropriately account for the carbon loss of deforestation, for example.

A4.1.C.2.30. In addition to the scores, Carbon Storage is also assessed in biophysical terms (tonnes of carbon dioxide equivalent; t CO_2e) and in monetary values. Please click on the info notes for respective headers for more information.

A4.1.C.2.31. For woodland, carbon stock (changes) are based on the Woodland Carbon Code (WCC) calculation tool (version 2.1). For other habitats, estimates are based on Natural England's publication Carbon Storage and Sequestration by Habitat 2021. Please note that there is still significant uncertainty particularly around soil carbon stock changes. Please also note that the impact of peatland management/degradation is not implemented yet. However, the development team is intending to implement that in subsequent versions. Not considered in this assessment are for example non-natural carbon impacts such as from building energy use or traffic (except the impacts of photovoltaic installations - see further below).

A4.1.C.2.32. The Carbon Storage Score is based on a habitat base score, as well as the following multipliers:

- Grazing & Mowing: The multiplier is slightly higher for non-degraded grassland habitats.
- Habitat maturity: The score is usually higher for mature habitats that have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure of creating the intended habitat is likely to reduce ecosystem services.

Cooling & Shading

A4.1.C.2.33. Green vegetation has an influence on the local climate, and particularly so in more urbanised areas. Urban areas are usually warmer than their surroundings. This Urban Heat Island Effect (UHIE) is caused by the built environment retaining heat, which is released during the night, as well as the concentration of waste heat from warming and cooling. The UHIE will

increasingly combine with global warming caused by climate change. Green vegetation and in particular trees have a significant cooling effect on the local climate in cities and towns. The temperature around vegetation is reduced by evapotranspiration. Trees and scrub also provide shading and protection from heat and UV radiation. Therefore, natural capital has the potential to play a vital role in helping urban areas to adapt to climate change.

A4.1.C.2.34. Cooling & Shading only indicates the contribution of natural vegetation. Not considered are for example sunshade sails which also provide shading but are not natural. Also not considered are engineered solutions to reduce waste-heat from buildings, for example.

A4.1.C.2.35. The Cooling & Shading Score is based on a habitat base score, as well as the following multipliers:

- Level of accessibility: The multiplier is slightly higher for sites that have better public access as people are more likely to benefit from shading.
- Population density/external visitor numbers: The multiplier is higher in areas with higher population density and/or which are frequently visited which indicates a higher demand/likelihood of exposure. For Cooling & Shading, the population density is more significant because it also indicates the level of urbanisation/UHIE.
- Habitat maturity: The score is usually higher for mature habitats that already have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure of creating the intended habitat is likely to reduce ecosystem services.

Erosion Protection

A4.1.C.2.36. Soil erosion happens when wind and water results in the loss of nutrients, minerals and organic compounds. Such loss reduces the fertility of soils and is therefore undesirable. Soil erosion also puts pressure on water bodies through increased sediment runoff. Vegetation cover can protect soils from eroding – especially complex vegetation such as woodlands and vegetation that provides good soil coverage such as grassland habitats. Arable fields where

soils are often exposed to water and wind provide lower erosion protection services.

A4.1.C.2.37. The Erosion Protection Score is based on a habitat base score, as well as the following multipliers:

- Slope steepness: The multiplier is higher for sites with steeper slopes because this makes soil erosion more likely which in turn indicates higher demand for Erosion Protection.
- Rainfall: The multiplier is higher in areas that experience more rainfall as heavy rain can contribute to soil erosion.
- Habitat maturity: The score is usually higher for mature habitats that have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure of creating the intended habitat is likely to reduce ecosystem services.

Flood Regulation

A4.1.C.2.38. Flood Regulation refers to the ability of natural habitats to slow down and store water in case of a flooding event. Woodlands, for example, do this by canopy interception, infiltration and water storage in soils.

A4.1.C.2.39. Please note that the Flood Regulation Score only provides a rough indication of flood regulation. Modelling floods is complex, and this high-level assessment cannot capture the full complexity of flooding events. Not considered, for example, is the reduced level of damage/disruption mitigated flooding events would otherwise cause. Hence, scores are essentially indicative.

A4.1.C.2.40. The Flood Risk Regulation Score is based on a habitat base score, as well as the following multipliers:

- Flood regulation location: The multiplier is higher in locations that are more likely to be flooded as long as water could run off (flow routes).
- Habitat maturity: The score is usually higher for mature habitats that have reached their full ecosystem services potential.

- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure of creating the intended habitat is likely to reduce ecosystem services.

Water Quality Regulation

A4.1.C.2.41. Vegetation can, retain, remove and transform for example nitrate pollution from agricultural habitats or other pollution sources such as from sewage overflows during periods of heavy rainfall. The complexity of vegetation is important because complex vegetation can trap more pollutants when water flows through.

A4.1.C.2.42. Not considered in the score are engineered water quality improvement measures such as chemical water treatment facilities.

A4.1.C.2.43. The Water Quality Regulation Score is based on a habitat base score, as well as the following multipliers:

- Water status: The multiplier is higher for sites located in areas with generally poorer water quality, indicating a higher demand for the service.
- Habitat maturity: The score is usually higher for mature habitats that have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure of creating the intended habitat is likely to reduce ecosystem services.

Pest Control

A4.1.C.2.44. Pest Control describes nature's ability to self-regulate pests which are species that compete with humans for provisioning services such as food. Birds and spiders, for example, prey on pests and therefore naturally control pest populations. Chemical pesticides are a threat to natural pest control because natural enemies of pests are often more susceptible than the pests themselves. This is because pests build up resistance to chemical pesticides whilst their predators are more vulnerable and also generally smaller in population. Semi-natural habitats tend to have higher Pest Control Scores than improved grassland or arable fields, for example.

A4.1.C.2.45. Not considered in this score are for example chemical pest treatment or other non-natural measures. Also not considered is the local demand for Pest Control as this would require further context analysis. Arguably, Pest Control is more important in areas with higher volumes of agricultural production, for example.

A4.1.C.2.46. The Pest Control Score is based on a habitat base score, as well as the following multipliers:

- Habitat maturity: The score is usually higher for mature habitats that have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure of creating the intended habitat is likely to reduce ecosystem services.

Pollination

A4.1.C.2.47. Most wild plants and crop species depend on insect pollination. Hence, pollination represents a vital ecosystem service supporting food supply and other ecosystem services such as aesthetic values. Many pollinators in the UK, especially those associated with semi-natural habitats, have become less widespread which may have implications for pollination services. Semi-natural habitats tend to have higher Pollination scores than for example improved grassland.

A4.1.C.2.48. Not considered in this score is the local demand for Pollination as this would require further context analysis. Arguably, Pollination is more important in areas with higher volumes of agricultural production, for example. Also not considered are for example the presence/establishment of bee hives on a site.

A4.1.C.2.49. The Pollination Score is based on a habitat base score, as well as the following multipliers:

- Habitat maturity: The score is usually higher for mature habitats that have reached their full ecosystem services potential.

- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure of creating the intended habitat is likely to reduce ecosystem services.

Provisioning (Category)

A4.1.C.2.50. The provisioning score is an aggregated headline indicator. It indicates the overall provisioning performance of the project and is based on scores for all ecosystem services/benefits as well as the Policy Priorities within this category. This is effectively based on a Multi Criteria Decision Analysis (MCDA) framework and does NOT represent the overall value change in provisioning performance. Hence, the indicative provisioning score should be read and interpreted alongside the individual ecosystem services/benefit results within the category (and objectives where applicable).

A4.1.C.2.51. The aggregated provisioning score is calculated as the average of each ecosystem services/benefits score below, each multiplied by the aggregation weight attached to the respective Policy Priority (see Policy Priority for further detail).

Food & Fish | Commercial

A4.1.C.2.52. Commercial food and fish production includes all production/catch that has a commercial purpose – essentially food/fish that is produced/caught to be sold. This is in contrast to community food and fish which is assessed below.

A4.1.C.2.53. The score only captures grown food but does not include for example pig or poultry farms. This is because arguably such food production is not based on an ecosystem service (apart from the food grown to feed animals which is included in the score). It could also lead to double-counting with grown food that is then fed to livestock.

A4.1.C.2.54. The Food & Fish - Commercial Score is based on a habitat base score, as well as the following multipliers:

- Commercial food/fishing function: Scores are zero if a habitat is not used for commercial fishing/food production.

- Agricultural Land Classification (ALC) grade: The multiplier for food production is higher for sites with a better ALC grade. The ALC grade indicates the quality of land for agricultural production. Please note that the ALC grade multiplier only applies to habitat types which typically rely on it. Habitat types that are not connected to ALC classification include woodland which may be used to collect mushrooms.
- Water status: The multiplier for fish production is higher for water that has a good status.
- Habitat maturity: The score is usually higher for mature habitats that have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure of creating the intended habitat is likely to reduce ecosystem services.

Food & Fish | Community

A4.1.C.2.55. Community food and fish production refers to non-commercial food production such as gathering berries and mushrooms or managing an allotment for private consumption. This service also includes non-commercial angling where the fish caught can be kept.

A4.1.C.2.56. Not captured within the score is the recreational aspect of, for example, recreational fishing or enjoying gardening in an allotment. The score only indicates the produce, rather than the experience of the process.

A4.1.C.2.57. The Food & Fish - Community Score is based on a habitat base score, as well as the following multipliers:

- Community food/fishing function: Scores are zero if a habitat is not used for community fishing/food production.
- Water status: The multiplier for fish production is higher for water that has a good status.
- Habitat maturity: The score is usually higher for mature habitats that have reached their full ecosystem services potential.

- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure of creating the intended habitat is likely to reduce ecosystem services.

Water Availability

A4.1.C.2.58. The availability of water is, for example, crucial for ensuring affordable and safe drinking water and sanitation. Habitats such as running and standing water contribute directly to water abstraction whilst other habitats such as wetlands and woodlands allow the recharge of groundwater as surface water can impede through soil. This water availability function can be interrupted when surfaces are sealed or compacted, for example.

A4.1.C.2.59. Water Availability needs to be distinguished from water supply where water is actually abstracted. This has not been included because information is usually difficult to obtain. Also not considered within the score is the local demand for water availability, for example whether water is/will be in shortage in an area.

A4.1.C.2.60. The Water Availability Score is based on a habitat base score, as well as the following multipliers:

- Habitat maturity: The score is usually higher for mature habitats that have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure of creating the intended habitat is likely to reduce ecosystem services.

Wood Production

A4.1.C.2.61. Wood Production includes harvesting of timber and other woodland products such as wood-based biofuels or firewood. Woodland habitats usually receive the highest scores, but orchards, scattered trees and scrub can also provide some level of woodland products.

A4.1.C.2.62. The Wood Production Score is based on a habitat base score, as well as the following multipliers:

- Woodland management: The multiplier is higher if a woodland is primarily managed for wood/timber production. The score is zero for woodlands that are not managed for wood production.
- Habitat maturity: The score is usually higher for mature habitats that have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure of creating the intended habitat is likely to reduce ecosystem services.

Annex 4.1.D. NATURE Tool Ecosystem Services Prioritisation

A4.1.D.1. Proposed Scheme

Table A4-1-22 – Proposed Scheme ecosystem services pioritisation

Benefits & Ecosystem Services	Default Priorities for Scotland	Applied policy priority	Justification and references
Mental Health	High	Medium	The Argyll and Bute Council Biodiversity Duty Action Plan, which outlines the council's statutory biodiversity duties, has four overarching outcomes in which biodiversity contributing to health and wellbeing is mentioned. Encouraging the use of the LLTNP to help realise the personal health and wellbeing benefits of connecting with nature and being active in the outdoors comprises Outcome 9 of the NPPP. NPF4 includes health as an important policy and recognises nature's positive impact on it. It is considered as MEDIUM because the project's location is far from the community.
Physical Health	High	Medium	The Argyll and Bute Council Biodiversity Duty Action Plan, which outlines the council's statutory biodiversity duties, has four overarching outcomes in which biodiversity contributing to health and wellbeing is mentioned. Encouraging the use of the LLTNP to help realise the personal health and wellbeing benefits of connecting with nature and being active in the outdoors comprises Outcome 9 of the NPPP. NPF4 includes health as an important policy and recognises nature's positive impact on it. It is considered as MEDIUM because the project's location is far from the community.

Benefits & Ecosystem Services	Default Priorities for Scotland	Applied policy priority	Justification and references
Aesthetic Values	Medium	High	The positive management and enhancement of the internationally renowned landscape of the National Park (NP) are mentioned as part of the three overarching NP Partnership Plan (NPPP). Outcomes, which form the basis for the vision of the Local Development Plan (LDP) for the Loch Lomond and Trossachs National Park (LLTNP). The LLTNP NPPP states that ‘we will work to conserve and enhance the special landscape and cultural heritage qualities of the area.’ LLTNP in the NPPP underlines the importance of aesthetic values in the A83 route. ‘Supporting projects that enhance opportunities to enjoy landscapes, particularly along major transport routes and around settlements, including implementing a strategically planned and designed upgrade to the A82 between Tarbet and Inverarnan, and continuing to review landslip management measures on the A83 at The Rest and Be Thankful. Additionally, this service is strongly linked to Sense of place in the context of the NP, which is designated as being of 'HIGH' importance.
Education & Knowledge	Low	Medium	Promoting understanding and enjoyment of the National Park is one of the four aims of National Parks that the LDP for each Park must contribute. As stated in the LDP, the encouragement and support for recreational and educational opportunities is also a 'core' part of the work done by the NP. The Argyll and Bute Council Biodiversity Duty Action Plan, which outlines the council's statutory biodiversity duties, has four overarching outcomes: biodiversity contributing to education (formal, informal and lifelong learning) is mentioned. Additionally, the site includes SSSI and SPA for Golden Eagles areas, which support the importance

Benefits & Ecosystem Services	Default Priorities for Scotland	Applied policy priority	Justification and references
			of the site in terms of educational value (unique ecology/wildlife).
Interaction with Nature	Medium	Medium	A subsidiary objective of outcome 9 of the NPPP concerning improving health and learning recognises the health benefits of 'connecting with nature' and thus is for the NP to be 'used more' as a place to do this.
Recreation	High	High	Promoting understanding and enjoyment of the NP is one of the four aims of NP that the LDP for each Park must contribute. As stated in the LDP, the encouragement and support for recreational and educational opportunities is also a 'core' part of the work done by the NPA. Visitor experience also comprises one of the core aims of the NPPP, with two outcomes focussed specifically on increasing terrestrial and water-based recreational opportunities. A83 connects to relevant recreational sites (Rest and be thankful, Loch Lomond, etc.)
Sense of Place	High	High	The conservation of the cultural (and natural) heritage of the National Park is one of the four aims of NP that the LDP to each Park must contribute. Additionally, the LDP states that if there is a conflict between any of the aims, greater weight must be given to this aim. Biodiversity and cultural heritage also constitute priority services, according to the NPA.

Benefits & Ecosystem Services	Default Priorities for Scotland	Applied policy priority	Justification and references
Air Quality Regulation	Medium	Medium	The Argyll and Bute Council Biodiversity Duty Action Plan, which outlines the council's statutory biodiversity duties, has four overarching outcomes. Argyll and Bute's sustainable management of natural resources for social and economic prosperity, including clean air, potable water, soil and native flora and fauna, is mentioned. The National transport Strategy (NTS), Strategic Transport Projects Review (STPR2) and STPR2 for Argyll and Bute, mention the improving air quality. STPR2 for and Bute says 'While emissions in Argyll & Bute make up a small proportion (1.8%) of Scotland's total transport emissions, there are opportunities for the region to contribute positively to the country's ambitious statutory targets to tackle the global climate emergency.' The plans do not include nature as part of the emissions mitigation, but the project has the potential to support this outcome. However, A83 is not in air quality management area or urban area, which is where would consider attributing high importance.
Carbon Storage (Habitats)	Medium	High	Policy 1 NPF4 states that "When considering all development proposals significant weight will be given to the global climate and nature crises." Additionally, "*LDPs must address the global climate emergency and nature crisis by ensuring the spatial strategy will reduce emissions*." Policy 2, climate change mitigation and adaptation of the NPF4 also states: "*Development proposals will be sited and designed to minimise lifecycle greenhouse gas emissions as far as possible.*"
Cooling & Shading	Medium	Low	No mention of this in local policy. Given the rural location, this has been attributed a LOW priority.

Benefits & Ecosystem Services	Default Priorities for Scotland	Applied policy priority	Justification and references
Erosion Protection	Low	High	Policy 4 NPF4 states that, "*development proposals will only be supported if they are designed and constructed in a manner that protects soil from damage including from compaction and erosion*." Additionally, the primary driver for the Proposed Scheme is to improve the resilience of the road network against landslips. Transport plans also mention to ensure the transport system adapts to the projected climate change impacts, and to deliver safe and resilient roads. The Argyll and Bute Council Biodiversity Duty Action Plan, which outlines the council's statutory biodiversity duties, has four overarching outcomes, in which the sustainable management of Argyll and Bute's natural resources for social and economic prosperity, including clean air, potable water, soil and native flora and fauna, is mentioned.
Flood Regulation	High	Medium	According to the A83 Story Map, one of the environmental sensitivities which will help to shape the design proposals will be 'existing and predicted future areas at risk of flooding.' One of the specific actions of Outcome 3 of the NPPP is also to "*work with partners and communities to better adapt to, and mitigate against, the impacts of climate change via initiatives which reduce flooding impacts.*" NPF4 Policy 2 states that "*development proposals which create, expand or enhance opportunities for natural flood risk management, including blue and green infrastructure, will be supported*." Transport plans also mention to ensure the transport system adapts to the projected climate change impacts, and to deliver safe and resilient roads. Check on whether it's a local threat to disruption of the highway and edit importance accordingly. Water environment team considered Flood regulation

Benefits & Ecosystem Services	Default Priorities for Scotland	Applied policy priority	Justification and references
			as a MEDIUM priority: The baseline situation is that a high likelihood flood risk zone has been identified on SEPA flood mapping adjacent to the Croe Water, which widens at various locations downstream, including where it meets the sea loch. The fact that the floodplain gets inundated will alleviate flood risk to receptors downstream. Less flood risk downstream would be beneficial to users of the Old Military Road and other receptors on valley floor downstream, but there may be limited receptors to benefit. The flood risk assessment for the project will seek to avoid the proposed development being flooded or causing flooding elsewhere, it is unlikely to reduce flood risk, although that may be a side-effect if particular engineering solutions are adopted.
Water Quality Regulation	Medium	High	The Argyll and Bute Council Biodiversity Duty Action Plan, which outlines the council's statutory biodiversity duties, has four overarching outcomes, in which the sustainable management of Argyll and Bute's natural resources for social and economic prosperity, including clean air, potable water, soil and native flora and fauna, is mentioned.
Pest Control	Low	Low	Within local policy reviewed, INNS was only mentioned in the NPPP, which states that the "*NPA will support targeted work on reducing the impact of INNS*" in its Natural Capital outcomes.
Pollination	Medium	Medium	Pollination was not mentioned across any locally-specific policy documents, however, NPF4, the Argyll and Bute Biodiversity Plan, NPPP expose their interest on nature crisis/biodiversity. Pollination is intrinsically linked with biodiversity. It is also linked to food production.

Benefits & Ecosystem Services	Default Priorities for Scotland	Applied policy priority	Justification and references
Food & Fish - Commercial	High	Low	Outcome 1 of the NPPP, concerning Natural Capital, states that "we will work with others to deliver multiple benefits from nature including natural flood management, carbon storage, and sustainable timber and food production." This is the only mention of food production within local policy reviewed. Commercial food production is of limited relevance to the glen. The Population & Human Health team agrees it is a LOW priority for the Proposed Scheme.
Food & Fish - Community	Medium	Low	Outcome 1 of the NPPP, concerning Natural Capital, states that "*we will work with others to deliver multiple benefits from nature including natural flood management, carbon storage, and sustainable timber and food production*." This is the only mention of food production within local policy reviewed. The value of the glen to local food production is considered relatively LOW.
Water Availability	Medium	Low	The Argyll and Bute Council Biodiversity Duty Action Plan, which outlines the council's statutory biodiversity duties, has four overarching outcomes, in which the sustainable management of Argyll and Bute's natural resources for social and economic prosperity, including clean air, potable water, soil and native flora and fauna, is mentioned. Water availability is not mentioned as a priority in the local plans. The site location is far from community areas. The Water environment team considered it to be of LOW priority for the Proposed Scheme: Water availability is likely to be high for surface water receptors. Private water supplies data has been requested but not yet confirmed. Water availability is unlikely to be affected by the Proposed Scheme.
Wood Production	High	Medium	Outcome 1 of the NPPP, concerning Natural Capital, states that "*we will work with others to deliver*

Benefits & Ecosystem Services	Default Priorities for Scotland	Applied policy priority	Justification and references
			multiple benefits from nature including natural flood management, carbon storage, and sustainable timber and food production." However, it is worth noting there is an emphasis on sustainable timber production and that there is a trend towards the removal of conifer plantation within the wider glen for the purposes of habitat restoration and improving slope stabilisation. Most of the valley is owned by family estate (tenant forestry) as well as FLS. The Population & Human Health team considered wood production as MEDIUM priority for the Proposed Scheme: there is wood production next to green route, however, the fact that trees need to be removed with the construction of route does not have a big impact in the wood production because those trees are meant to me removed soon anyway.
Photovoltaic Carbon Avoided	Medium	Low	No solar panels within the Proposed Scheme.

A4.1.A.1. Enhancement sites

Table A4-1-23 – Enhancement sites ecosystem services pioritisation

Benefits & Ecosystem Services	FLS Site South of RABT Carpark (Site 1)	FLS Riparian Site (Sites 3a)
Mental Health	Medium	Low
Physical Health	Medium	Low
Aesthetic Values	High	High
Education & Knowledge	Medium	Low
Interaction with Nature	Medium	Low

Benefits & Ecosystem Services	FLS Site South of RABT Carpark (Site 1)	FLS Riparian Site (Sites 3a)
Recreation	High	Low
Sense of Place	High	High
Air Quality Regulation	Medium	Medium
Carbon Storage (Habitats)	High	High
Photovoltaic Carbon Avoided	Low	Low
Cooling & Shading	Low	Low
Erosion Protection	High	High
Flood Regulation	Medium	Medium
Water Quality Regulation	High	High
Pest Control	Low	Low
Pollination	Medium	Medium
Food & Fish - Commercial	Low	Low
Food & Fish - Community	Low	Low
Water Availability	Low	Low
Wood Production	Low	Low