Appendix A12.8: Positive Effects for Biodiversity and Biodiversity Net Gain

1.1 Introduction

The purpose of this appendix is to provide details on the enhancements identified to deliver positive effects for biodiversity, as well as the results of the Biodiversity Net Gain (BNG) assessment.

The appendix is structured as follows:

- Policy, Legislation, and Guidance.
- Methods.
- Results.
- Next Steps.
- References.
- Annex 1: BNG Metric Results.

1.2 Policy, Legislation and Guidance

National Planning Framework 4 (NPF4)

1.2.1 The Scottish Government has outlined its intention to tackle the current 'climate emergency' and 'biodiversity crisis' (Scottish Government, 2020a). To achieve this, the Scottish Government has stated that 'our approach to planning and development will play a critical role in supporting nature restoration and recovery' (Scottish Government, 2023). In February 2023 Scottish Ministers adopted National Planning Framework 4 (NPF4), updated in October 2024 (Scottish Government, 2024), which incorporates a plan led approach to achieving six outcomes including 'securing positive effects for biodiversity'.

1.2.2 NPF4 considers that 'Scotland's future places will be net zero, nature-positive places that are designed to reduce emissions and adapt to the impacts of climate change, whilst protecting, recovering and restoring our environment'. By securing positive effects for biodiversity, NPF4 will create and strengthen nature networks whilst still encouraging and facilitating development where there is a strategic need.

1.2.3 As summarised in 12.2.3 to 12.2.6 of Chapter 12 (Biodiversity), NPF4 has a number of policies associated with improving biodiversity and helping to secure positive effects for biodiversity (PEB).

1.2.4 Of particular importance is Policy 3: Biodiversity. The policy states developments "*…will contribute to the enhancement of biodiversity, including where relevant, restoring degraded habitats and building and strengthening nature networks and the connections between them*". It further states that "*…development proposals for national or major development, or for development that requires an Environmental Impact Assessment [EIA] will only be supported where it can be demonstrated that the proposal will conserve, restore and enhance biodiversity, including nature networks so they are in a demonstrably better state than without intervention. This will include future management. To inform this, best practice assessment*

methods should be used. Proposals within these categories will demonstrate how they have met all of the following criteria:

- *the proposal is based on an understanding of the existing characteristics of the site and its local, regional and national ecological context prior to development, including the presence of any irreplaceable habitats;*
- *wherever feasible, nature-based solutions have been integrated and made best use of;*
- *an assessment of potential negative effects which should be fully mitigated in line with the mitigation hierarchy prior to identifying enhancements;*
- *significant biodiversity enhancements are provided, in addition to any proposed mitigation. This should include nature networks, linking to and strengthening habitat connectivity within and beyond the development, secured within a reasonable timescale and with reasonable certainty. Management arrangements for their long-term retention and monitoring should be included, wherever appropriate; and*
- *local community benefits of the biodiversity and/or nature networks have been considered."*

1.2.5 Policy 3 seeks to tackle biodiversity and address *Policy 1: Tackling the climate and nature crises* through reversal of biodiversity loss, safeguard ecosystem services and building resilience.

1.2.6 For the proposed scheme to be compliant with this policy, the EIA Report (EIAR) must assess and report, using best practice assessment methods, that biodiversity will be in a demonstrably better state than without the proposed scheme; and that the five criteria above have been met, including that biodiversity enhancements are provided, in addition to any proposed mitigation. For biodiversity enhancements, the significance of these enhancements must be able to be defined as significant or not significant.

DMRB LA 108

1.2.7 DMRB guidance, DMRB LA 108 (Highways England et al., 2020), contains an obligation to consider '*environmental net gains*' when reporting the scale and nature of biodiversity changes and the opportunities for environmental enhancements, where possible. LA 108 defines '*environmental net gains'* as '*an approach to development that aims to leave the natural environment in a measurably better state*'. The Scotland National Application Annex to LA 108 states that there are no specific requirements for Transport Scotland supplementary or alternative to those given in LA 108.

Positive Effects for Biodiversity

1.2.8 In 2023, NatureScot published 'Developing with Nature Guidance' (NatureScot, 2023) aimed at addressing Policy 3(c) of NPF4 (securing positive effect for biodiversity) for non-EIA development projects. It describes potential enhancement measures (referred to as 'biodiversity measures'), and how to determine whether they are appropriate. Whilst the guidance clearly states it is not intended for EIA projects, as the measures would not address the full complexity of a project of EIA scale, it is nonetheless useful for informing an approach for EIA projects.

1.2.9 The Scottish Biodiversity Strategy to 2045 (Scottish Government, 2022) supports the aim of tackling the climate and biodiversity crises through its objectives and closely aligns itself with NPF4. The strategies main objectives are to '*protect and restore biodiversity*' and to '*support healthier ecosystems'*, '*connect people with the natural world*' and to '*involve them more in decisions about their environment*' as well as to '*maximise the benefits for Scotland of a diverse natural environment and the services it provides, contributing to sustainable economic growth*.'

Biodiversity Net Gain (BNG)

1.2.10 BNG is an approach to development that ensures that habitats are left in a measurably better state than before the development. Whilst not mandatory by law in Scotland, BNG is enshrined in law under Schedule 7A of the Town and Country Planning Act 1990 (as inserted by Schedule 14 of the Environment Act 2021) in England and by Section 6 of the 2016 Environment (Wales) Act where it is referred to as net benefit for biodiversity. In England, BNG is mandatory for minor sites and is expected to extend to Nationally Significant Infrastructure Projects, from late November 2025.

1.2.11 For the purposes of BNG, biodiversity value is measured in standardised biodiversity units. A habitat will contain a number of biodiversity units, depending on size, quality, location and type. Biodiversity units can be lost through development or generated through compensation and enhancement.

1.2.12 To calculate the number of biodiversity units for an existing habitat, or habitat enhancements to achieve BNG, the statutory biodiversity metric tool is used. This tool applies the statutory biodiversity metric formula, as summarised below. In England, developers (currently of minor sites as discussed in 1.2.10 above) must deliver a BNG of 10%.

Statutory Biodiversity Metric

1.2.13 For BNG, the statutory biodiversity metric (Defra, 2024) is the method of quantifying biodiversity value by measuring all types of habitat, including:

- grassland;
- hedgerows;
- lakes;
- woodland; and
- watercourses such as rivers and streams

1.2.14 The metric calculates the number of biodiversity units within a given boundary by considering the size, condition, strategic significance and type of habitats, in addition to other descriptors such as the distinctiveness of a habitat type. This provides a baseline for which net gain can be marked against. For proposed creation and enhancement of habitats, the statutory biodiversity metric considers the difficulty in creating/enhancing a habitat, the time taken for the habitat to reach the target condition, and the distance from the habitat loss that the compensation is taking place. The metric has in-built prescribed trading rules based on habitat

types and distinctiveness to ensure that the relative value of existing biodiversity is maintained after development.

Application of BNG in Scotland

1.2.15 Whilst the statutory biodiversity metric (hereafter referred to as 'the metric') can be directly applied to developments in Scotland, there are aspects of the metric that do not fit well to the Scottish environment, or would benefit from refinement. For example, pre-defined attributes such as habitat distinctiveness and multipliers for habitat creation, might not necessarily be appropriate in a Scottish context.

1.2.16 Research commissioned by the Scottish Government to explore options for developing a biodiversity metric or other tool, specifically for Scotland, was reported in 2023 (McVittie et al, 2023). The report outlines the considerations required in developing a metric specific to Scotland and noted 'with refinement, Natural England's Biodiversity Metric 3.1 could be adapted for planning and development use, and as part of a wider set of metrics within a biodiversity framework. These refinements include the coverage of habitats, and adjustments to condition assessment and multipliers to reflect Scottish contexts'. This research is now being considered, along with responses to a consultation process undertaken in 2024 (NatureScot, 2024a), by Scottish Government; however, the development and adoption of a metric may not be available for some time (updates are provided on NatureScot website (NatureScot, 2024b)). As such there is currently no Scotland specific metric available and no obligation for positive effects to be 'measurable'.

Application of the metric for the proposed scheme

1.2.17 There is a drive for the application of a quantifiable approach to securing benefits for biodiversity across Transport Scotland's portfolio. Furthermore, LA 108 notes that the reporting of the scale and nature of biodiversity changes can include biodiversity metric evaluation. The use of the metric as part of the EcIA would also support compliance with NPF4 Policy 3 in assessing whether the proposed scheme leaves the natural environment in '*a measurably better state*' post-development.

1.2.18 Whilst there are elements of the metric that do not necessarily fit in a Scottish context as discussed above, it is considered to be broadly applicable to the proposed scheme with limitations. This is primarily due to the comparative lowland situation of the proposed scheme, and lack of blanket bog habitats. Furthermore, in the current absence of a Scottish-specific biodiversity accounting tool, the metric provides the most appropriate best practice method to quantifying change in biodiversity value. Therefore, the metric has been applied on the proposed scheme as discussed in Section 1.3.

1.2.19 The metric is used to inform the design at DMRB Stage 3, mitigation requirements (particularly avoidance where possible) and to identify the extent of habitat restoration and creation required to achieve a gain in biodiversity value.

1.2.20 The metric has been used as a tool in the delivery of overall PEB. A summary of the approach taken to incorporate BNG and PEB into the DMRB Stage 3 EcIA process is shown in Diagram 1. The BNG metric provides a quantitative assessment of losses and gains as a result of the

proposed scheme, which coupled with the PEB approach, informs the design and the application of mitigation.

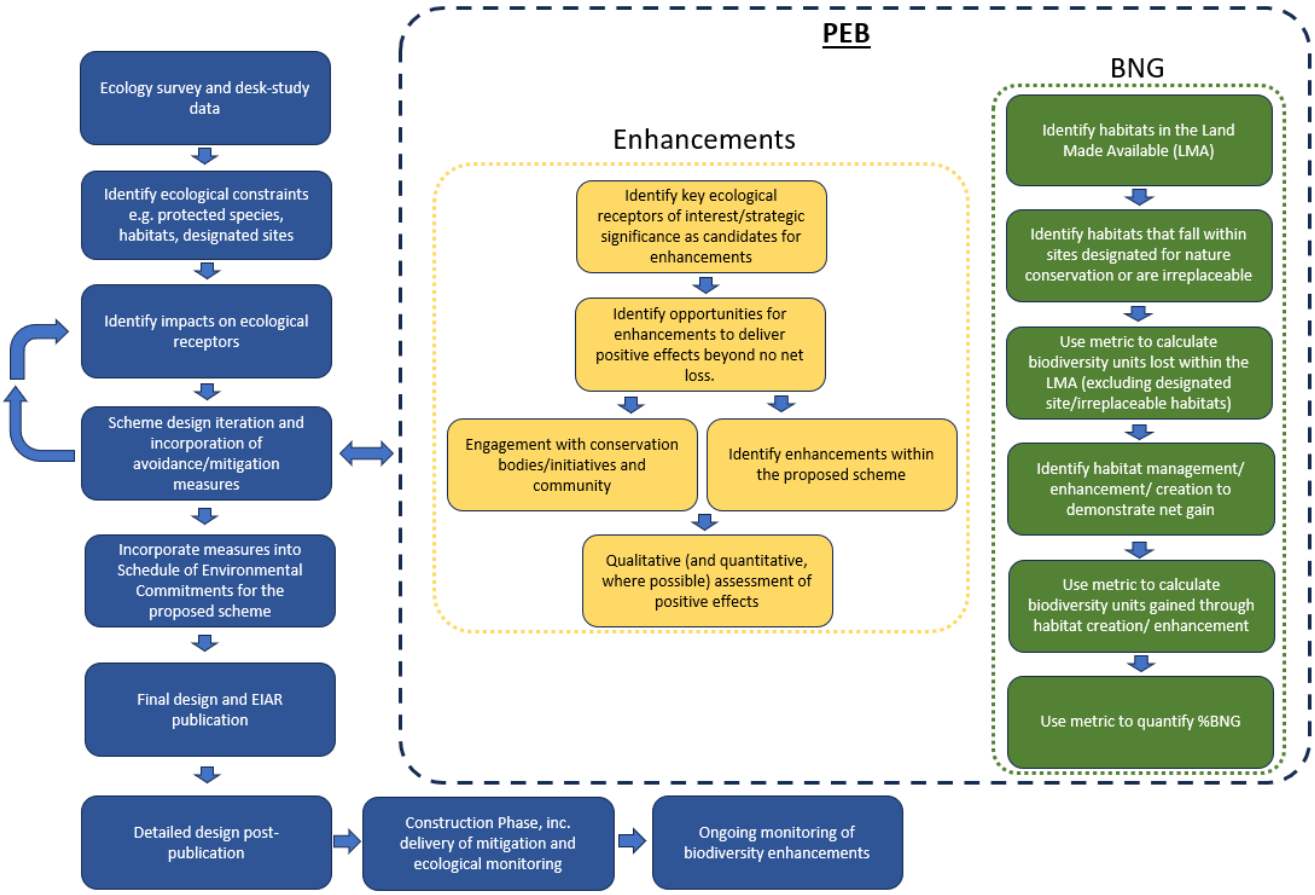

Diagram 1: Summary of Ecological Impact Assessment (EcIA) and how BNG and PEB have been used to inform the process.

1.3 Methods

1.3.1 The EcIA seeks to achieve the standard position of 'no net loss' by identifying impacts and associated effects on all biodiversity resources (habitats and species) within the zone of influence from the proposed scheme. Design changes and mitigation are applied to avoid or reduce effects to a non-residual state; where residual effects remain, further mitigation or compensation measures are applied.

1.3.2 Professional judgement based on data, knowledge of the scheme and available guidance and local plans, has been used to identify enhancement opportunities for the proposed scheme over and above, and clearly delineated from, the mitigation and compensation identified through the standard no net loss approach.

1.3.3 Enhancement measures focus on items highlighted through the polices in NPF4 and the NatureScot guidance such as restoring degraded habitats, measures to increase populations of priority species and strengthening existing nature networks at various scales but including at the landscape and long-term scales (e.g. 30 years in line with BNG). The enhancement

measures also target priority species and habitats within the zone of influence such as those highlighted in the Tayside Local Biodiversity Action Plan (LBAP).

1.3.4 This approach seeks to achieve nature conservation outcomes that demonstrably exceed existing obligations (i.e. to be additional to other activities that would occur anyway).

1.3.5 Designated sites (SACs, SPAs, Ramsars) are considered separately through the Habitats Regulations Appraisal (HRA) process, and any mitigation or compensation required due to effects on designated sites cannot be considered towards securing PEB as these measures would have been necessary to avoid an adverse effect on site integrity.

1.3.6 Ancient woodland is not included in BNG as it is categorised as an irreplaceable habitat. However, compensatory planting will be undertaken which will reduce the magnitude of the impact over time as the woodland matures (see Appendix A12.6: Woodland Strategy).

Surveys and data

1.3.7 Habitat surveys were undertaken to provide a baseline for habitats within and adjacent to the proposed scheme. Phase 1 habitat survey data was collected in the early stages of the project and at DMRB Stage 2. In 2021, 2022 and 2024 these habitat surveys were updated using the UK Habitat Classification (UKHab) for DMRB Stage 3 assessment. Condition assessments were undertaken for woodland habitats only during the UKHab surveys in 2021, 2022 and 2023. Condition assessments for all habitats were undertaken for UKHab surveys in 2024 (see Appendix A12.3: Detailed Survey Methods and Baseline Data).

1.3.8 Protected species survey data was collected over several years from 2016 to 2024 (see Appendix A12.3: Detailed Survey Methods and Baseline Data and Appendix A12.4: Confidential Biodiversity Resources).

Application of the metric

1.3.9 UKHab data collected from the surveys in 2020, 2021, 2024 and 2025 were used in the metric[1] (see Appendix A12.3 (Detailed Survey Methods and Baseline Data) for habitat descriptions and detailed survey methodology).

1.3.10 The UKHab data were processed to be used in the metric as follows:

- Condition assessments were undertaken for woodland habitats only during the UKHab surveys in 2021, 2022 and 2023, as noted above. The condition assessments for non-woodland habitats recorded during these surveys was undertaken retrospectively based on field survey notes and photographs, professional judgement and adopting a precautionary approach. As noted above, condition assessments for all habitats were undertaken in the field during surveys in 2024 and 2025.
- Strategic significance was assigned to habitats using desk-based data, field survey data and professional judgement. Categories were assigned as follows:

[1] https://assets.publishing.service.gov.uk/media/65c60e83cc433b000ca90b32/The_Statutory_Biodiversity_Metric_Calculation_Tool_-_Macro_disabled_02.24.xlsx

- High: The habitat type is mapped and described as locally ecologically important within a specific location, within documents specified by the relevant planning authority. This is taken to be all habitats within the River Tay SAC.
- Medium: This category can be applied when the planning authority has not identified a suitable document for assessing strategic significance. This is based on professional judgement and is taken to be all ecologically valuable habitats (including woodland, waterbodies, grasslands) that could/do support protected species.
- Low: Where the definitions for high or medium strategic significance are not met. This is taken to be all other habitats, particularly in urban areas where habitats are categorised as being heavily modified or improved.

1.3.11 No amendments to the metric have been made, and the following points have been considered in its application:

- The Boundaries of the Site (BoTS) has been used to calculate the biodiversity units by identifying areas within the Draft CPO that are to be retained. There are habitats that, whilst within the draft Orders limits, will be safeguarded during the construction phase, therefore, these have been identified as being retained in the calculations. This allows a true reflection of loss.
- The habitat survey data has been overlaid with the verified Ancient Woodland Inventory (AWI) layer (see Appendix A12.6: Woodland Strategy). Ancient woodland loss as a result of the proposed scheme will not be used to calculate the biodiversity unit losses as it is an irreplaceable habitat and compensation must be dealt with outwith the metric. Where an area was recorded under the verified AWI as a habitat other than woodland, a manual adjustment was made to habitat type to retain it in the AWI for the assessment.
- Woodland created as compensation for ancient woodland loss is not included within the habitat creation/enhancement calculations. This is considered separately due to ancient woodland being irreplaceable habitat (as above).
- The baseline for the site will focus specifically on the terrestrial habitat polygons recorded during the UKHab surveys. No baseline for linear features or watercourses will be compiled, and impacts to watercourses will not be assessed through the metric. The metric requires the use of the MoRPh methodology for assessing river condition which requires formal accreditation of surveyors and is developed for use on English rivers. As highlighted in McVittie et. al (2023), MoRPh methodology's application to river condition may require refinement to better reflect Scottish rivers, and the requirement for accreditation would need to be considered in Scotland before a framework for delivering the metric is rolled out. As there is still uncertainty on the suitability and practicality of applying MoRPh assessment methods in Scotland, the approach to securing BNG for watercourses follows the application of the mitigation hierarchy and identification of enhancement measures that can be employed to deliver positive effects beyond 'no-net-loss'.
- The landscape and ecology planting proposals will be used to provide a post-development baseline within the site for the proposed scheme for use in the metric. Additional areas

will also be required for the compensation of woodland; habitat surveys, including condition assessments, will be required for these areas to inform the calculations. Additional areas will also be considered for enhancement opportunities.

- It is assumed that there will be a delay in the creation of habitats within the boundary of the proposed scheme, both for habitat creation and enhancement. Based on the construction programme, it will be assumed that there will be a five year delay in creation for woodland and a four year delay in creation of other habitats. These timescales will be included in the metric for post-development habitat creation. Where possible, advanced planting will be undertaken, focusing particularly on areas that are not directly impacted by the proposed scheme (such as the two areas within the Draft CPO that are located approximately 2.5km south of the proposed scheme (Muir of Thorn and Gelly Wood) and any additional off-site enhancement/ habitat creation areas. Any advance habitat creation will also be included in the metric.
- Post-development habitats/planting proposals have been developed with Landscape (Chapter 10) and are shown on Figure 10.6 (Landscape and Ecology Mitigation). The planting proposals are in keeping with the characteristics of the area and have been designed to maximise benefit for protected species. Trading rules as specified in the metric have not been explicitly considered in the development of the planting proposals. The most suitable habitats to fit with the surrounding environment, and to support the protected species within the area, have been proposed following collaboration with the project team on Landscape, rather than being constrained to prescribed requirements of the metric.

Identification of enhancement opportunities

1.3.12 Survey data and desk study data (Appendix A12.3: Detailed Survey Methods and Baseline Data and Appendix A12.4: Confidential Biodiversity Resources) was evaluated for opportunities for enhancements for habitats and protected species beyond mitigation requirements as necessitated by the EcIA process.

1.3.13 A desk study was undertaken to identify local initiatives that could offer a way of delivering enhancements for the proposed scheme. Furthermore, consultation with Forestry Land Scotland, Atholl Estates and Murthly Estates was undertaken to identify opportunities for voluntary enhancements within land adjacent to the proposed scheme. Consultation will be ongoing to identify additional off-site areas for enhancement as required.

Limitations/Deviations/Assumptions

1.3.14 Condition assessments of non-woodland habitats were undertaken post-survey, as discussed in paragraphs 1.3.7 and 1.3.10. However, as a precautionary approach to condition assessments has been adopted ensuring a worst-case scenario is assessed, this is not considered to be a limitation to the assessment.

1.3.15 A desk study was undertaken to assign habitat type and condition for the two areas within the Draft CPO that are located approximately 2.5km south of the proposed scheme (Muir of Thorn and Gelly Wood). A precautionary approach to condition has been adopted. Further survey

effort is required of these areas which may result in changes to the habitat and condition assigned. This would be reflected in a future iteration of the metric.

1.3.16 The strategic significance of habitats for use in the metric was assigned retrospectively, adopting a high-level and precautionary approach as mentioned in paragraph 1.3.11. As a precautionary approach has been adopted, this is not considered to be a significant limitation to the assessment.

1.4 Results

BNG Metric

1.4.1 The on-site baseline units for the proposed scheme total 1070.49 units. As discussed in paragraph 1.3.11 this does not take into account watercourses or linear features. The on-site post-intervention habitat units total 774.82 units. This results in a net change of -295.66 biodiversity units for the proposed scheme (i.e. -27.62% net change) (see Table 1 in Annex 1).

1.4.2 Woodland, grassland and scrub habitat creation is included throughout the proposed scheme and a total of 399 individual trees (outwith woodland areas) will be planted. Diagram 2 presents a breakdown of the post-development habitat creation areas for the proposed scheme, excluding individual trees and ancient woodland compensation planting. Broad habitat types presented within Diagram 2 are consistent with UKHab definitions. All post-development habitats, including individual trees, SuDS ponds and ancient woodland compensation, are shown on Figure 10.6.

1.4.3 There is not adequate area within the proposed scheme boundary to deliver net gain in biodiversity units. However, securing voluntary enhancement and habitat creation opportunities in additional off-site areas (outwith the Draft CPO) that have been identified following engagement with Murthly Estates, Atholl Estates and FLS (see paragraph 1.3.13) would reduce the deficit in biodiversity units.

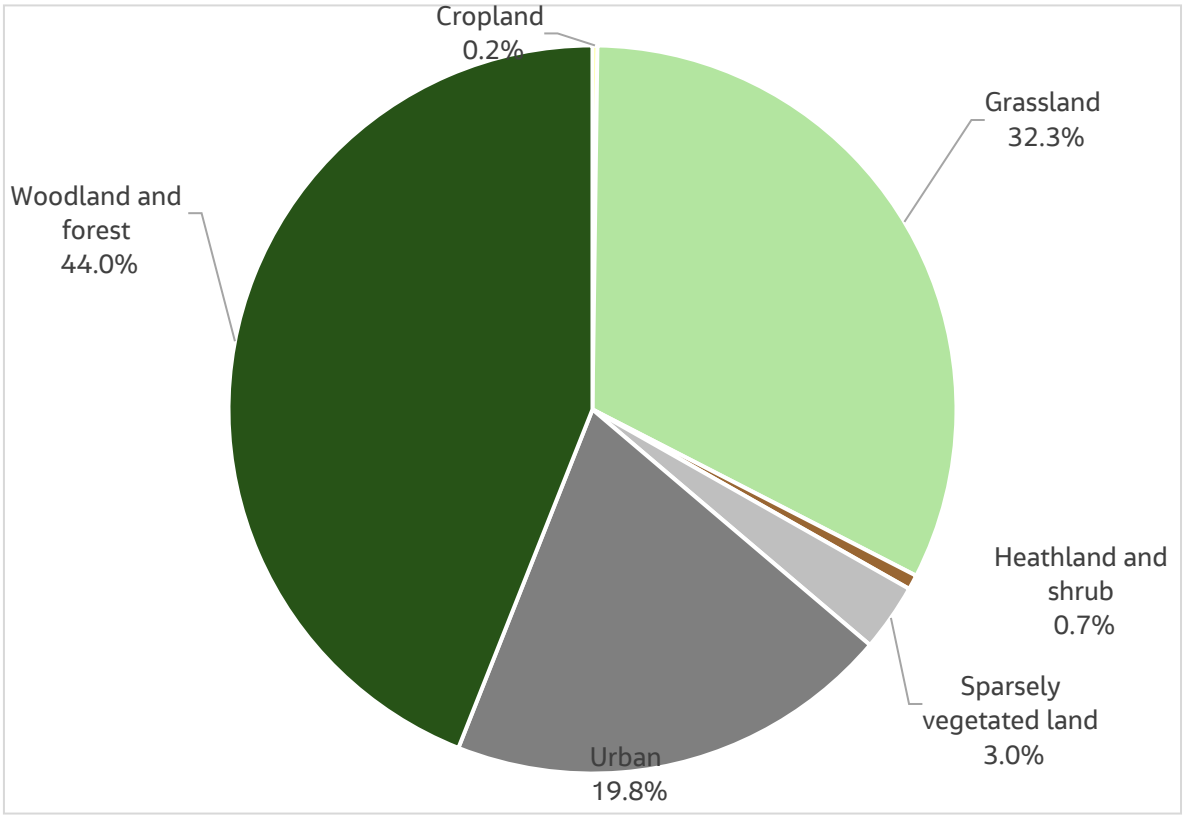

Diagram 2: Summary of the post-development habitats for the proposed scheme. Individual trees are excluded

1.4.4 In addition to habitat creation as discussed above and in Annex 1, additional off-site areas of habitat (not within the Draft CPO) will be enhanced/created through securing voluntary agreements and supporting local initiatives where possible.

Enhancements: Habitats

1.4.5 The principal approach to delivering enhancements is adopting a habitat based approach which provides benefit for a wide range of species, as well as connectivity and resilience for future climatic changes and changes to/expansion of species ranges.

1.4.6 In addition to habitat creation discussed in paragraphs 1.4.1 to 1.4.4 above and Annex 1, additional habitat creation and enhancement measures will be undertaken as part of the requirement to deliver positive effects for biodiversity.

1.4.7 The following subsections detail the habitat enhancements that are proposed for the proposed scheme. Paragraphs 1.4.30 to 1.4.45 provide species specific habitat creation and enhancements that are proposed in addition to general habitat enhancements discussed below. Together these enhancements will deliver PEB.

<u>Woodland</u>

1.4.8 Woodland creation as shown on Figure 10.6 will comprise native species and increase connectivity along the proposed scheme, and within the wider area. This approach follows

guidance from the Lawton Review (Lawton et al., 2010) which highlights the importance of ecological networks and delivering bigger, better and more joined up areas.

1.4.9 Creation of an area of upland oak woodland on the new embankment around ch3500-ch4000 will be undertaken and will contribute to delivering BNG, as discussed in paragraphs 1.4.1 to 1.4.4. Extending and enhancing upland oakwoods is a priority on the Tayside LBAP, therefore, creation of this woodland type has strategic significance, as well as benefits for oakwood specialist species.

1.4.10 The structural diversity of rides and clearings within existing woodland will be enhanced through varied habitat management regimes including felling and mowing, in addition to planting with a mix of shrubs and trees. Bays or scalloped edges will be incorporated along rides with box junctions (where glades are created from the extension of junctions where rides join) incorporated at intersections (particularly those with southern aspects) to provide a range of environmental conditions (including shelter and temperature), providing suitable habitats for a range of terrestrial insects. Newly created woodland will be planted to optimise diversity.

1.4.11 Woodland plantations along the scheme (see Appendix A12.6: Woodland Strategy and Figure 10.6) will be actively managed to diversify the structure, age, and species of trees. Selective felling of coniferous species will be undertaken and a mix of native broad-leaved trees will be planted in clearings and along edges to support a rich variety of insects and enhance foraging opportunities for bats and birds. A variety of native trees like oak, ash, birch will be planted as different species support different invertebrates. Additionally Scots pine will be planted to provide cones for red squirrel (*Sciurus vulgaris*) and additional diversity for invertebrates and other fauna. A mix of ages of trees will be planted to provide additional diversity in seed production and spatial structure.

1.4.12 A proportion of felled trees will be retained for log piles to provide habitats for invertebrates, reptiles and other species. The proportion of felled trees to be retained will be determined following consultation. This deadwood will be relocated to areas in close proximity to where felling has taken place to reduce the potential for spread of tree diseases. In addition, fallen trees and branches will be retained, or relocated to semi-shaded areas within and adjacent to woodlands and standing dead or dying trees will be left as they provide food for insects and potential roosting sites for bats.

1.4.13 Pollarding of ancient/veteran trees, where appropriate, will help to maintain trees that support a variety of insects and offer roosting sites. New trees will be planted, or natural regeneration encouraged, to ensure continuity as older trees die.

1.4.14 Creation of ponds/scrapes to enhance woodland value for invertebrates, birds and bats will be created. Ponds will be located to ensure they complement rather than detract from the habitat. Conifer plantations are particularly suitable for new ponds. See paragraphs 1.4.22 to 1.4.24 below also.

Grassland

1.4.15 Species-rich grassland is proposed throughout the scheme as shown on Figure 10.6. Within these areas important food sources for invertebrates will be included to enhance these habitats. For example, common rock rose (*Helianthemum nummularium*) and kidney vetch (*Anthyllis vulneraria*) will be included in planting mixes in appropriate areas throughout the proposed scheme to support butterfly species, including those listed on the Tayside LBAP (Tayside Biodiversity Partnership, 2016) and SBL (Scottish Government, 2020b) (see Mitigation Item P02-E52 in Chapter 22: Schedule of Environmental Commitments).

1.4.16 Grasslands will be enhanced for the benefit of terrestrial invertebrates and reptiles, among other species, by maintaining structural diversity of sward heights through grazing/mowing, leaving areas of longer grasses. Areas throughout the proposed scheme, including the flood compensatory storage area and temporary reptile translocation areas, will be managed as a habitat mosaic, and the management of scrub will be undertaken to prevent scrub encroachment into grassland habitats. Please refer to 1.4.40 also.

1.4.17 Grassland habitats are important for bats and birds for foraging due to the invertebrates they support. In order to improve grasslands for bats and birds, the following specific enhancements are proposed:

- Trees will be planted along the field boundary south of the Erigmore Leisure Park to provide habitat connectivity and enhance the foraging resource in the area (see Figure 10.6b).

1.4.18 Natural flooding or wetting of grassland areas can support habitat diversity which is of value for species including bats, birds, reptiles and invertebrates.

Species-rich roadside verges and central reserves

1.4.19 There is opportunity to create a network of species-rich grassland verges along the proposed scheme providing habitat for wildlife and contributing to a bigger, better and more joined up ecological network. Enhancements will be focused on the proposed scheme extent, however, there are opportunities for enhancement along the wider road network. It is intended that there will be a collaboration with the other A9 Dualling projects, particularly the Tay Crossing to Ballinluig project, to support this wider network of biodiverse verges for the benefit of wildlife.

1.4.20 Roadside verges will be designed for the benefit of biodiversity where there is no conflict with safety of road users, or other overriding factors. Best practice guidance (Plantlife, 2021) will be followed to design species-rich grassland verges at appropriate locations along the proposed scheme. Combined with the installation of bee and bug hotels (see paragraph 1.4.45 below), the verges will provide an important resource for invertebrates and other wildlife. The specification for roadside verges will be included within the Construction Environmental Management Plan (CEMP) (see Mitigation Item SMC-S1 in Chapter 22: Schedule of Environmental Commitments).

1.4.21 Transport Scotland have undertaken vegetation trials to investigate the potential for vegetating central reserves instead of using stone chippings as standard (Transport Scotland

undated). Results from these trials will be used to develop appropriate seed mixes for use in central reserves along the extent of the proposed scheme, providing enhancement for biodiversity. The specification for central reserves will be included within the Construction Environmental Management Plan (CEMP) (see Mitigation Item SMC-S1 in Chapter 22: Schedule of Environmental Commitments).

Ponds and Wetland Habitats

1.4.22 Water and wetland habitats are important for a range of species, for example invertebrates, amphibians, reptiles, bats and birds. The creation of wetland habitats will provide enhancements for biodiversity. Large shallow ponds or a series of smaller ponds with varied depths, diverse vegetation, and overhanging trees will be most effective.

1.4.23 SuDS within the proposed scheme extent will be designed to be of benefit for biodiversity to provide enhancements. Six SuDS will be detention basins comprising areas of wet grassland mix with shallow scrapes, and one SuDS will be a permanently wet retention pond/wetland to provide a permanent water feature and enhance the local area for biodiversity. These habitats will enhance the area for invertebrates, bats and birds, providing a good foraging resource.

1.4.24 Wetlands/ponds will be provided (see 1.4.26 and 1.4.27 and Figure 10.6 for locations) and managed to include the following features:

- Varied marginal vegetation: a mixture of plant species in marginal areas will be developed to offer diverse habitats for invertebrates to shelter and breed.
- Trees and shrubs: shading will be limited to no more than 25% of the pond edge, keeping overhanging vegetation on the northern side, providing a balance of light and shelter.
- Submerged vegetation: ponds will be designed and managed to include submerged plants to support aquatic invertebrates and provide egg-laying sites for species like dragonflies.

1.4.25 A scrape will be provided within the woodland between ch400-700 to offer habitat diversity and a foraging resource for bats using a known maternity roost in the area (see Appendix A12.4 Confidential Biodiversity Resources). Enhancing the food resources in the locality of the roost has the potential to enhance the maternity roost by providing food for lactating females in close proximity to the roost.

1.4.26 A series of ephemeral scrapes/ponds will be included adjacent to the quarry at ch6700-6800 to provide habitat for invertebrates and a foraging resource for reptiles.

1.4.27 A pond will be provided to the east of the Tay Crossing at ch7300-7600 to provide a habitat mosaic for the benefit of multiple species, including reptiles, birds and bats.

Linear Habitats

1.4.28 Linear habitats, such as hedgerows, tree lines, overgrown banks, ditches, and watercourse edges, are vital foraging areas rich in insect diversity. These features are important for bats, as they prefer to navigate along these corridors rather than crossing open spaces. The linear habitats offer shelter from wind and protection from predators, allowing bats to effectively

access their food sources. As a result, bats often travel significant distances to avoid open areas, choosing these sheltered paths instead.

1.4.29 The creation of linear habitats and the adoption of the following management practices will provide biodiversity enhancement for roosting and foraging bat species:

- As stated in 1.4.18 above, trees will be planted along the field boundary south of the Erigmore Leisure Park to provide habitat connectivity and enhance the bat foraging in the area (see Figure 10.6b).

Enhancements: Protected species

1.4.30 The following enhancement measures for protected species are proposed to deliver additional PEB. Enhancements for protected species primarily focus on the provision of suitable habitat and connectivity to provide resilience for species as a result of future climatic changes. Therefore, there is overlap between habitat enhancements discussed in paragraphs 1.4.5 to 1.4.30 and enhancements for individual species discussed in the sections below.

Birds

1.4.31 Loss of breeding bird habitat will be mitigated through landscape and ecological planting as shown on Figure 10.6 and discussed in Appendix A12.7 (Impact Assessment Tables).

1.4.32 Nest boxes for species with limited nesting areas/pressures on nesting habitat will be installed in appropriate locations along the proposed scheme; this includes barn owl (*Tyto alba*), swallow (*Hirundo rustica*), swift (*Apus apus*)and kingfisher (*Alcedo atthis*).

Bats

1.4.33 Loss of bat roosts will be mitigated through the installation of bat boxes and potential veteranisation of trees throughout the proposed scheme, as shown on Figure 10.6, and discussed in Appendix A12.7 (Impact Assessment Tables). Monitoring of these bat boxes will be undertaken for a limited period post-construction, to be determined upon consultation with NatureScot and detailed within a Species Management Plan.

1.4.34 Long-term monitoring and ongoing management of bat boxes will enhance this mitigation. Data from monitoring can be used to inform further habitat creation, as well as providing data to contribute to national databases. Whilst not a tangible enhancement, monitoring and knowledge sharing has the potential to have wider reaching benefits for bats.

1.4.35 Woodlands that are suitable for foraging and commuting but offer limited roost potential due to tree age or species will be subject to additional veteranisation to add roosting opportunities. The features created through veteranisation will also be used by fungi, birds and other mammal species. Additional veteranisation of trees will be undertaken to improve woodland for bats in woodlands at the following locations:

- Northbound: ch2100 - 2400, ch3300 - 4000 and ch4600 - 4900
- Southbound: ch2300 – 4300, ch4800 - 5700, ch5900-6500, and ch7500 -7600

1.4.36 Veteranisation of trees within coniferous woodland will provide roosting opportunities, but more importantly will offer habitats for invertebrate prey species, thus enhancing the foraging potential of the woodland. Details on tree veteranisation will be agreed with NatureScot, following review of the approach to tree veteranisation on A9 Dualling: Luncarty to Birnam.

Red squirrel and pine marten

1.4.37 Loss of suitable pine marten (*Martes martes*) and red squirrel habitat will be mitigated through landscape and ecological planting as shown on Figure 10.6, and provision of artificial dreys and dens as required (see Appendix A12.7: Impact Assessment Tables).

1.4.38 Additional enhancement will be achieved through the installation of additional artificial red squirrel dreys and pine marten dens to promote abundance of these species in woodlands adjacent to the proposed scheme, and in the wider area. Locations for red squirrel dreys and pine marten dens are shown on Figure 10.6.

1.4.39 Due to known pine marten predation on grey squirrel, enhancement of areas for pine marten is shown to contribute to the control of grey squirrel populations and is already utilised in the area (FLS, 2022). Consultation and collaboration with FLS will be undertaken to enhance efforts already underway to provide a larger, more joined up network of suitable pine marten habitat adjacent to the proposed scheme and within the wider area.

Reptiles

1.4.40 Loss of reptile habitat will be mitigated through landscape and ecological planting as shown on Figure 10.6 (see also Appendix A12.7: Impact Assessment Tables). Enhancement will be achieved through the provision of additional areas which will be managed for reptiles. These areas have been selected to enhance habitat connectivity and ensure reptiles can move between areas safely and establish new populations. These areas will create a larger, more connected network to deliver resilience to reptile populations.

1.4.41 Hibernacula will be provided within areas of reptile habitat (locations shown on Figure 10.6).

1.4.42 A herpetofauna tunnel is proposed to provide connectivity between temporary and permanent reptile areas to mitigate for fragmentation and mortality and enhance connectivity between areas of reptile habitat.

1.4.43 The quarry and adjacent woodland at ch6700-6800 will be modified to create a reptile area, offering a mosaic of habitats to provide basking, foraging and hibernation opportunities. A series of ephemeral scrapes (see 1.4.27) will be provided, and selective felling of trees will provide habitat heterogeneity and some sheltered warm areas. Hibernacula will be included in the area, enhancing existing features where possible.

Aquatic Biodiversity Resources

1.4.44 Impacts on fish will be avoided or mitigated by several of the general mitigation measures, as discussed in Appendix A12.7: Impact Assessment Tables. Enhancements for aquatic biodiversity resources will include the following:

- Landscape planting of broad canopy tree species such as alder and willows upstream and downstream of culverts to soften the riparian habitat and improve lighting transition for fish (light to dark).
- Riparian woodland with bankside tree/shrub planting to provide habitat, food/nutrients and shading for fish and freshwater pearl mussel (FWPM)(*Margaritifera margaritifera*). Installation of beaver proof fencing/measures to protect trees to ensure the long-term benefits for fish and FWPM.
- Optioneering into the possibility to construction small wetland scrapes and/or backwaters with deeper water connected to existing watercourses will be undertaken. These would provide heterogeneity of aquatic habitats within the locality.

Invertebrates

1.4.45 Impacts on terrestrial invertebrates will be avoided or mitigated by several of the general mitigation measures, as discussed in Appendix A12.7: Impact Assessment Tables. Enhancements for terrestrial invertebrates will include the following:

- Bee and bug hotels constructed along the scheme to provide habitat for a range of invertebrate species (see Mitigation Item P02-E51 in Chapter 22: Schedule of Environmental Commitments).
- Common rock rose and kidney vetch will be included in grassland throughout the proposed scheme to benefit butterflies, particularly northern brown argus (*Aricia artaxerxes*) and small blue (*Cupido minimus*) for which these species are a primary food source. These species are specified as species of focus on the Tayside LBAP (see Mitigation Item P02-E52 in Chapter 22: Schedule of Environmental Commitments).
- Standing and fallen dead wood (like stumps and branches) supports many saproxylic (dead wood-dependent) invertebrates. Deadwood will be retained in varying conditions (sunny, shaded, damp).
- Habitat diversity will be provided as enhancement throughout the proposed scheme, through the creation of scrapes, woodland glades, selective felling and INNS control.
- Deadwood will be artificially created by topping or cutting trees as part of the approach to woodland enhancement, as discussed in paragraph 1.4.13. A variety of tree species will ensure diverse saproxylic populations.

Community engagement and other actions

1.4.46 The following measures will be undertaken to deliver additional PEB.

Community engagement

1.4.47 Engagement with community/volunteering/national initiatives has the potential to enhance the mitigation measures for protected species and habitats as specified in Chapter 12 (Biodiversity) and Chapter 22 (Schedule of Environmental Commitments). The following opportunities have been identified which will be explored further:

- Support monitoring projects to improve understanding of protected species presence/abundance within the area.
  - For example the National Bat Monitoring Programme (NBMP) Nathusius' Pipistrelle (*Pipistrellus nathusii*) project[2] for Dunkeld/Birnam/Perth area. Nathusius' pipistrelles, one of the rarest bat species in Scotland, were recorded during surveys (see Appendix A12.3: Detailed Methods and Baseline Data) and by providing support for equipment to facilitate monitoring (harp traps/sonic lures/radio tracking tags etc.), data can be gathered to determine whether a breeding population is present, allowing protection measures to be developed. The same process could also be used to further understand how *Nyctalus* species bats are using the area. As discussed in paragraph 12.3.34 of Chapter 12 (Biodiversity), the changing climate could see these species breeding ranges extend further northwards.
- Support volunteering/community schemes and groups focused on environmental aims and access to nature within the wider area.

Road Signs

1.4.48 The inclusion of road signage on side roads to alert road users to the potential presence of red squirrels, otter (*Lutra lutra*) and badger (*Meles meles*), has the potential to further reduce mortality of these species, enhancing mitigation measures discussed in Appendix A12.7 (Impact Assessment Tables) and Chapter 22 (Schedule of Environmental Commitments). Any signage would be agreed with Transport Scotland and would comprise of warning signs with additional plates describing the identified hazard (i.e. otters, red squirrels, badger) (Transport Scotland, 2022).

Invasive Non-Native Species (INNS) management

1.4.49 Rhododendron (*Rhododendron sp.*) management (and other INNS if identified e.g. Japanese knotweed (*Reynoutria japonica*), Himalayan balsam (*Impatiens glandulifera*)) will be undertaken throughout the proposed scheme. INNS management will provide biodiversity benefits, including improving the quality of retained ancient woodland. With regards to woodland, the removal of INNS aligns with priorities/actions from the Tayside LBAP, specifically: improve environmental value of woods and forests; enhance ancient woodlands; reduce direct pressures on woodland biodiversity and ecosystem health from INNS. INNS management throughout the proposed scheme will reduce the INNS burden within the proposed scheme footprint and adjacent areas, and deliver long-term enhancement by allowing for the recolonisation of native flora.

1.5 Next steps

Specimen Design

1.5.1 At specimen design stage there will be refinements and variations to the proposed scheme which may result in changes to the extent of habitat creation/retention. This would include

[2] https://www.bats.org.uk/our-work/national-bat-monitoring-programme/surveys/national-nathusius-pipistrelle-survey

consultations (see paragraph 1.3.13) as part of the identification of additional off-site areas for enhancement.

1.5.2 The metric should be re-run as part of the ongoing iterative design process to ensure that BNG and PEB is retained at the same level or better than at DMRB Stage 3, and that any change does not introduce a new significant effect or change the significance of effect from not significant to significant, in terms of the EIA Regulations, from those reported in this EIAR. This will be undertaken by a suitably qualified ecologist acting on behalf of Transport Scotland.

Monitoring

1.5.3 In order to measure the net gain/positive effects of the proposed scheme, and inform targeted interventions to maintain or improve enhancements, it is important that post-construction monitoring is undertaken.

1.5.4 Monitoring of habitat creation as specified within the metric will be undertaken and reported on until at least the time it takes for the condition of the habitat to reach the target condition.

1.5.5 Monitoring of enhancement measures will be undertaken as specified within management plans. These plans will be developed and funded by Transport Scotland in conjunction with interested parties, as required, to ensure security in the delivery of the monitoring and provide a framework for feedback and improvement to ensure the efficacy of the enhancements.

1.6 References

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Annex 1: BNG Metric Results

Table A12.8-1: Summary of BNG Metric

Net project biodiversity units (Including all on-site & off-site habitat retention / creation)	*Habitat units*	**-295.66**
	Hedgerow units	**n/a**
	Watercourse units	**n/a**
Total project biodiversity % change (Including all on-site & off-site habitat creation + retained habitats)	*Habitat units*	**-27.62%**
	Hedgerow units	**n/a**
	Watercourse units	**n/a**

Combined habitat retention and enhancement	**Habitats**	**Hedgerows**	**Watercourses**
Total on-site and off-site baseline area / length	210.21	n/a	n/a
Total on-site and off-site baseline units	1070.49	n/a	n/a
Total on-site and off-site baseline area / length retained	103.06	n/a	n/a
Total on-site and off-site baseline units retained	443.58	n/a	n/a
Total on-site and off-site area / length proposed for enhancement	7.73	n/a	n/a
Total on-site and off-site baseline units proposed for enhancement	31.12	n/a	n/a
Total on-site and off-site baseline area / length lost	99.42	n/a	n/a
Total on-site and off-site baseline units lost	595.79	n/a	n/a