4. The Proposed Scheme

4.1. Introduction

4.1.1. This chapter describes the key components and construction activities associated with the Proposed Scheme in order to address the existing landslide and flooding issues outlined in Volume 2, Chapter 2: Need for the Proposed Scheme.

4.1.2. The Proposed Scheme introduces a number of improvements to the Old Military Road (OMR) including carriageway widening, a new structure and widening of an existing structure, culverts, traffic signs, drainage, watercourse crossings, earthworks and geotechnical measures and fencing. The Chapter also sets out the anticipated construction methodology and programme, Biodiversity Net Gain (BNG) and natural capital areas.

4.1.3. The information provided is based on the design of the Proposed Scheme at Scheme Assessment.

4.1.4. This EIA Report has been developed following re-location and re-alignment works at the existing link road between the A83 Trunk Road and the Old Military Road (OMR). The primary objective of this work was to relocate the existing link road from a known flood plain. The package of works involved the construction of a new link road and removal of the existing link road, between Chainage (Ch.) 0m and Ch. 450m. The package of work is referred to as ‘Phase 1’.

4.1.5. The Proposed Scheme is expected to be procured by means of a Design & Build (D&B) type contract. For this form of contract, the Appointed Contractor will undertake both the detailed design and construction of the Proposed Scheme. Responsibility for operating and maintaining the trunk road following completion of the Proposed Scheme including any maintenance period would remain with the Scottish Government. Responsibility for operating and maintaining side roads would remain with Argyll and Bute Council on completion of the Proposed Scheme.

4.1.6. Under a D&B type contract, a specimen (outline) design is prepared for the Proposed Scheme, which the Appointed Contractor(s) may optimise as the detailed design is developed. Such optimisation must comply with the Employer's Requirements and be within the constraints imposed by the Environmental Impact Assessment (EIA) Report.

4.1.7. Optimisation of the Proposed Scheme design will still be deemed to comply with this EIA Report provided that any design changes have been subject to environmental review to ensure that the residual impacts would not be greater or significantly different than those reported in this EIA Report, and subject to Transport Scotland's acceptance of the findings of any such review. Further detail on any future design modifications including associated environmental review can be found in Volume 2, Chapter 5: Overview of the Assessment Process.

4.2. Description of Proposed Scheme

4.2.1. Principal components of the Proposed Scheme are listed below with further description provided in this section.

- Proposed Alignment
- Proposed Junctions and Private Accesses
- Proposed Road Furniture
- Proposed Drainage
- Proposed Structures and Culverts and
- Proposed Earthworks
- Proposed Tree Felling

4.2.2. No permanent lighting is included in the Proposed Scheme.

4.2.3. Chapter 4 is supported by a number of figures contained in Volume 3 which show various elements of the Proposed Scheme. These include:

- Figure 4.1 provides an overview of the overall Proposed Scheme and is referred collectively as Volume 3, Figure 4.1 Scheme Layout Overview.

- Figure 4.2a shows the plan and profiles for the proposed alignment along the OMR and is referred collectively as Volume 3, Figure 4.2 Plan And Profiles.
- Figure 4.2b shows general arrangements of the Proposed Scheme indicating and annotating key design elements along the length of the OMR and is collectively known as Volume 3, Figure 4.2b General Arrangements.
- Figure 4.3 shows indicative general arrangements for the piped culvert improvements along the OMR and is collectively known as Volume 3, Figure 4.3 Watercourse Crossings.
- Figure 4.4 shows indicative drainage proposals for the Proposed Scheme including road and cut-off drainage, and is collectively known as Volume 3, Figure 4.4 Drainage Plans.
- Figure 4.5 shows indicative designs for geotechnical assets including typical cut and fill sections, HESCO barrier, earthworks bund and debris flow fencing details, and is collectively known as Volume 3, Figure 4.5 Geotechnical Assets,
- Figure 4.6 shows indicative general arrangements for the existing and proposed structures along the OMR and is collectively known as Volume 3, Figure 4.6 Structures General Arrangements.
- Figure 4.7 shows the proposed areas for Biodiversity Net Gain (BNG) and Natural Capital Enhancement Sites for the MTS, and is collectively known as Volume 3, Figure 4.7 BNG and Natural Capital Enhancement Sites.
- Figure 4.8 shows the various baseline habitats within the Proposed Scheme boundary and is collectively known as Volume 3, Figure 4.8 Baseline Terrestrial and Watercourse Habitat Plan.
- Figure 4.9 shows the expected habitats following completion of the Proposed Scheme and is collectively known as Volume 3, Figure 4.9 Post Development Terrestrial and Watercourse Habitat Plan.
- Figure 4.10 shows the various baseline habitats within the enhancement sites and is collectively known as Volume 3, Figure 4.10 Enhancement Site Baseline Terrestrial and Watercourse Habitat Plan.

- Figure 4.11 show the expected habitats within the enhancement sites following completion of the Proposed Scheme and is collectively known as Volume 3, Figure 4.11 Enhancement Sites Post Development Terrestrial and Watercourse Habitat Plan.

Iterative Design Development

4.2.4. The design of the Proposed Scheme has been developed in an iterative manner which has involved successive refinement to mitigate issues arising through the collation of new information on constraints or engineering problems as the Proposed Scheme has progressed. Each design iteration has resulted in incremental changes that provide solutions until an optimum design is reached, taking cognisance of the overall scheme objectives throughout.

4.2.5. For the Proposed Scheme, the iterative design process has included the following:

- multi-disciplinary design coordination meetings
- development and use of an environmental constraints mapping tool, capturing information held by stakeholders and survey data and
- a series of design refreshes

4.2.6. Design coordination meetings were held at regular intervals to provide environmental (and other) disciplines a forum to provide feedback on any constraints and an opportunity to address potential impacts associated with design proposals and refinements. This informed and influenced the development of the Proposed Scheme design.

4.2.7. In order to collate and share environmental and design information across the project team a web-based GIS tool, known as WebGIS, was developed. WebGIS is accessible to all project team members, providing easy access to a wide range of information including environmental constraints (protected species, habitats, cultural heritage features etc), geotechnical and topographical mapping, aerial imagery and design information. Information was regularly updated to capture site surveys, desk studies, stakeholder information and design refreshes. WebGIS allowed the developing design to be overlain with known constraint information to understand any impacts associated with the Proposed Scheme.

4.2.8. The iterative design process has also included stakeholder engagement, primarily via the bi-monthly meetings of the A83 Environmental Steering Group (ESG), as described in Volume 2, Chapter 6: Consultation and Scoping.

4.2.9. The key developments to the Proposed Scheme include:

- MTS Phase 1 works progressed as advance works and now constructed and complete – the new link tie-in between the OMR and A83 Trunk Road.
- Debris flow fences and rock fall fences were originally proposed between the OMR and A83 Trunk Road. Through discussion and agreement with Transport Scotland, these have been relocated upslope of the A83 Trunk Road and are being delivered separately as advanced works.
- Inclusion of new earthworks bund, culvert and debris flow fencing at the quarry adjacent to the A83 Trunk Road to provide greater resilience.
- Inclusion of a new earthworks bund adjacent to the OMR in place of HESCO Barrier extension to south of the existing.
- Inclusion of HESCO Barrier extension to the north of the existing.
- Realignment of the OMR adjacent to Building A following Road Safety Audit.
- Inclusion of Bridge D, a proprietary structure, to allow two-way running and remove the need to widen or replace existing Bridge A.
- Natural Capital and Biodiversity Net Gain mitigation sites developed and included.

Proposed Alignment

4.2.10. The Proposed Scheme introduces widening of the OMR to allow two-way traffic over a length of approximately 1.4km from the end of the existing two-way carriageway at Ch. 1,085m, to the existing HESCO barrier at approximately Ch. 2,450m, as shown on Figure 4.2b General Arrangements. At this point, the road tapers back to tie into existing single file traffic.

4.2.11. The Proposed Scheme will widen the overall cross-section of the OMR, where the existing carriageway width of between 3m to 3.5m is increased to 6.5m with a varying verge between 1m to 1.5m on either side. An exception to this is proposed Bridge D, discussed further below, which only carries southbound traffic where the carriageway width is 4m with 1m verge either side.

4.2.12. Beyond Ch. 2,450m, localised widening is proposed at three existing sharp bends to assist HGVs and larger vehicles in navigating the narrow carriageway when using the diversion route.

Proposed Junctions and Private Accesses

4.2.13. There are no proposals to introduce new junctions or make changes to existing junctions within the Proposed Scheme.

4.2.14. New direct accesses will be created with the adjacent land plots following Compulsory Purchase of the OMR. It is estimated at this time that 40 No. new direct accesses will be required from the OMR to adjacent land parcels.

Proposed Road Furniture

4.2.15. It is expected that road furniture will be limited to signage, speed cushions, marker posts and gates.

4.2.16. The detailed design of all road furniture for the Proposed Scheme will be part of the Appointed Contractor's responsibilities and will be undertaken in accordance with design standards and the Proposed Scheme contract documentation. Consultation will be required to be undertaken with Transport Scotland and Argyll and Bute Council, the local roads authority.

Proposed Drainage

4.2.17. Generally, the proposed road drainage philosophy is to maintain the existing drainage scenario or formalise drainage elements along the OMR, where feasible. Existing drainage has been assessed to determine the suitability and the potential to retain. Where proposed works are expected to impact the existing drainage, new formal drainage has been included in the design.

4.2.18. Where new drainage is proposed, the design includes filter drains (acting as combined surface and sub-surface drains), carrier drains, gullies, cut-off ditches / filter drains, locations of outfalls, chambers and catchpits.

4.2.19. Surface water runoff from the OMR drainage system derives from the road cross-section, including the carriageway and verges, together with the associated earthworks. Additional surface flow from natural catchment runoff draining towards the Proposed Scheme outside the verge-to-verge cross-section would be kept separate from the carriageway drainage system where practicable by cut-off drainage.

4.2.20. The cut-off drainage will be used throughout the Proposed Scheme to capture surface water run-off from embankments, cuttings and where existing ground profiles require control of run-off. The proposed cut-off drainage will replace existing drainage, where required, and divert runoff to local watercourses and channels.

4.2.21. In relation to water quality treatment, the drainage proposals aim to provide betterment and formalisation of drainage when compared to the current arrangement.

4.2.22. With regard to flood risk, a zero-detriment approach in comparison to the existing scenario has been adopted for the Proposed Scheme. This aligns with the requirements set out for flood management by Argyll and Bute Council who are in a local plan district with The Highland Council, with the latter being the Lead Local Authority. In line with section 6.13 of 'The Highland Council's Flood Risk and Drainage Impact – Supplementary Guidance', allowable discharge rates and volumes draining to a receiving watercourse / waterbody shall not exceed the existing runoff rates for Brownfield sites, or the Greenfield runoff rate for previously undeveloped sites. A climate change allowance of 46% has also been applied in line with Scottish Environment Protection Agency (SEPA) Document 'LUPS-CC1: Climate change allowances for flood risk assessment in land use planning'.

4.2.23. Where drainage networks are controlled to allowable discharge rates (based on a zero-detriment approach pre and post development assessment), the restriction of flow is achieved through the installation of flow controls such as vortex flow controls and orifice plates.

4.2.24. Attenuation of runoff is achieved through the use of oversized pipes, expected to be up to 500mm in diameter, avoiding the need for attenuation features such as ponds and basins.

Proposed Structures and Culverts

4.2.25. Two structures require additions or modifications to facilitate traffic along the OMR. There is a new proprietary structure, Bridge D, required alongside the existing Bridge A. Bridge B shall be widened using a precast arch solution, see Volume 3, Figure 4.6 Structures General Arrangements.

Bridge D - Proprietary Bridge

4.2.26. There is a requirement to install a proprietary bridge structure adjacent to Bridge A, at approximate Ch. 1,740m. This structure will carry the southbound traffic, whilst the existing Bridge A will carry the northbound traffic. The proprietary bridge will span the Croe Water downstream of the existing Cobbler Bridge.

4.2.27. The proprietary bridge will be provided by a specialist manufacturer and is anticipated to be constructed of structural steel with a proposed single span of 12 metres. It is assumed that the structure will be supported on reinforced concrete abutments upon spread foundations.

4.2.28. The structure will be simply supported, and is likely to be a modular, bailey bridge type structure.

4.2.29. Alternatives considered to the proposed proprietary bridge at Bridge D included:

- Widening of the existing structure. Discounted, as although possible, widening the existing structure to cater for two-way vehicle movements would be technically challenging, requiring the bridge to be closed for the duration of the works which could introduce wider resilience issues in Glen Croe.
- Provision for a permanent one-way structure parallel to the existing structure (Bridge A). Although similar to the preferred option, this was discounted as it would introduce a range of additional engineering, environmental and economic impacts.
- Demolition of the existing structure and provision of a two-way structure at the same location as the existing (Bridge A). Discounted as it was deemed to have the most significant impacts of all options considered with the demolition of a structure which is approximately 10 years old with significant works required in the watercourse.

Bridge B - Localised Widening

4.2.30. Planned realignment of the OMR requires localised widening of Bridge B, at approximate Ch. 3,215m. The downstream parapet will be demolished to extend the width of the structure by 1.5m and facilitate traffic in both directions.

4.2.31. A proprietary arch will be provided by a specialist manufacturer and is anticipated to be an unreinforced concrete arch with a clear span of 4.4m. The arch will be supported on newly constructed reinforced concrete abutments and spread foundations. The arch will span square to the abutments and therefore have no skew.

4.2.32. Spandrel walls will be precast sections, clad with locally sourced masonry, in keeping with the aesthetics of the existing bridge. The wingwalls will be reinforced concrete L-shaped walls, also faced in locally sourced masonry.

4.2.33. The carriageway width between kerbs is approximately 4.7m. The new downstream parapet will be constructed of masonry and have a height of 1.15m, in line with DMRB CD 377 'Requirement for Road Restraint Systems'. It will include a curve at the western end, where the parapet end protection cannot be provided. This is in line with Department for Transport Guidance on the Design, Assessment and Strengthening of Masonry Parapets on Highway Structures.

Culverts

4.2.34. There are improvements proposed to a total of 19 No. culverts and 2 No. new culverts as part of the Proposed Scheme, see Volume 3, Figure 4.3 Watercourse Crossings. Key information for each is provided in Table 4.1 below.

Table 4.1- Proposed Culvert Works

Culvert Reference	Figure 4.2b Description	Chainage (m)	Engineering Description
OMR_08	Extension Proposed	1,198	Extension length 3.108m: 1no. 375mm dia. plastic pipe
OMR_09	Twinned and extension proposed	1,320	Length 15.30m: 2No. 900mm dia. plastic pipes
OMR_10	Extension Proposed	1,410	Extension length 6.114m: 1No. 900mm dia. plastic pipe
OMR_11	Twinned, upsizing and extension proposed	1,451	Length 13.50m: 2No. 600mm dia. plastic pipes

Culvert Reference	Figure 4.2b Description	Chainage (m)	Engineering Description
OMR_12	Extension and upsizing proposed	1,608	Length 15.05m: 1No. 600mm dia. plastic pipe
OMR_14	Twinned and extension proposed	1,840	Length 21.10m: 2No. 900mm dia. plastic pipes
OMR_15	Extension Proposed	1,992	Extension length 14.346m: 1No. 600mm dia. plastic pipe
OMR_16	Twinned, extension and upsizing proposed	2,066	Length 16.30m: 2No. 800mm dia. plastic pipes
A83_Quarry	New culvert proposed	2,120	Length 13.94m: 1No. 000mm dia. plastic pipes
OMR_17	Twinned, extension and upsizing proposed	2,170	Length 12.9m: 2No. 700mm dia. plastic pipes
OMR_18	Twinned, extension and upsizing proposed	2,255	Length 13.51m: 2No. 900mm dia. plastic pipes
OMR_19	Extension proposed	2,370	Length 22.05m: 1No. 900mm dia. plastic pipes
OMR_20	Twinned and upsizing proposed	2,488	Length 11.92m: 2No. 600mm dia. plastic pipe
OMR_21	Twinned and upsizing proposed	2,581	Length 7.91m: 2No. 900mm dia. plastic pipes

Culvert Reference	Figure 4.2b Description	Chainage (m)	Engineering Description
OMR_21_New	Proposed new culvert	2,581	Length 7.91m: 1No. 1200mm dia. plastic pipe
OMR_22	Upsizing proposed	2630	Length 6.21m: 1No. 600mm dia. plastic pipe
OMR_26	Twinned and upsized	2,896	Length 9.92m: 2No. 500mm dia. plastic pipes
OMR_27	Twinned and upsized	2,940	Length 6.32m: 2No. 900mm dia. plastic pipes
OMR_29	Twinned and upsized	3,118	Length 6.26m: 2No. 600mm dia. plastic pipes
OMR_34	Upsizing proposed	3,507	Length 10.59m: 1No. 600mm dia. plastic pipe
OMR_35	Upsizing proposed	3,527	Length 8.9m: 1No. 600mm dia. plastic pipe

Table Note – all culverts will have a minimum 200mm C30 concrete surround

HESCO Barrier

4.2.35. The preliminary design for the proposed extension to the HESCO barrier is a continuation north from the existing barrier, for approximately 150m, terminating at Ch. 2,630m.

4.2.36. The front face of the barrier will be approximately 6m in height, allowing for embedment of the HESCO MIL units. The rear height will vary, as required, to provide deflection of debris flows to the low point behind the existing barrier. The alignment of the barrier will be at a skew to the OMR to take advantage of the change in gradient and maximise the potential capacity of the barrier. The form of the barrier will be optimised to reduce the excavation into the hillside as far as possible.

4.2.37. A new culvert, (ref. OMR_21_New), will be provided below the HESCO barrier extension to enable continuity of the existing watercourse.

4.2.38. Alternatives considered to the extension of the HESCO barrier included:

- Removal of the existing HESCO barrier and provision of an earth bund. Discounted as there is insufficient space between the OMR and A83 to provide an earthworks bund of sufficient size and scale to mitigate the geohazard / landslide risk.
- Removal of the existing HESCO barrier and provision of a reinforced earth structure. Discounted as it generally does not provide any significant benefits in comparison to extending the existing HESCO barrier.
- Removal of the existing HESCO barrier and provision of a reinforced concrete retaining wall (e.g. similar to the DFW included adjacent to the A83). Discounted as it is a significant engineering solution which brings potentially significant impacts across a range of engineering, environment and economic criteria.

Debris Flow Fencing

4.2.39. Debris flow and rock fall fences are proposed above the A83 Trunk Road to increase the resilience of the OMR. New fences are proposed where there are currently no geotechnical interventions in place above the A83 Trunk Road, this includes the slopes either side of the old quarry at approximate Ch. 2,040m and Ch. 2,180m. The slope angles here are generally steep and often exceeding 30°.

4.2.40. The two proposed fences are 30m and 35m in length and require a minimum height of 3.5m. The fences typically include steel posts attached to concrete foundations. The posts are anchored upslope with upslope anchor ropes including integrated braking elements. A primary net is attached to upper and lower support ropes. Secondary meshes may be incorporated into the design for retaining the fine material.

Proposed Earthworks

4.2.41. The widening of the OMR will require various low height soil cuttings and embankments. The proposed cut slopes are generally 1V:3H, with a maximum height of approximately 7.5m at Ch. 1,228m. The proposed widening on embankment has side slopes of 1V:2H, with a maximum height of 5m at Ch. 2,110m.

4.2.42. Two debris flow protection earthwork bunds are required to protect the A83 Trunk Road and the OMR during debris flow and rock fall events. The preliminary design for the bunds has slopes of 1V:1.5H and a crest width of 3m. It is anticipated that the bunds will be constructed using a high friction granular fill. Geogrid reinforcement may be incorporated in the design to provide additional stability.

4.2.43. The proposed earthwork bund adjacent to the OMR begins at Ch. 2,150m and continues parallel to the OMR until Ch. 2,300m where it ties into a rise in the existing topography. The bund has a height of approximately 6m from crest to toe on the OMR facing side and is offset 2m from the edge of the carriageway. The height from crest to toe of the rear face of the bund, which will define the retention capacity of the bund, has a maximum height of 4m at Ch. 2,270m. The rear height varies throughout the bund as the toe ties in with the natural topography of the slope behind the bund and a drainage ditch is then cut in to the existing slope at the bund toe. Two existing culverts (Culvert OMR_17 and Culvert OMR_18) will be extended and upsized below the bund to ensure continuity of the existing watercourses and enable adequate slope drainage.

4.2.44. A second earthwork bund is proposed at the entrance to the disused quarry above the A83 Trunk Road. Located away from the OMR, the bund is at approximately Ch. 2,120m when taken perpendicularly from the MTS chainage markers. The bund has a height of approximately 3m from crest to toe on the A83 facing side and will tie-in to the steep quarry walls at both ends. A new culvert (A83_Quarry) will be required below the bund to ensure that flows from the quarry reach the existing culvert intake at the A83. Minor earthworks will also be required to improve the existing open channel between the quarry and the A83 Trunk Road.

Proposed Tree Felling

4.2.45. There is potential for one tree to be felled adjacent to the OMR at Ch. 1,400m. Records show that this is a mature ash tree. Felling may be required as the works associated with the culvert improvements to the OMR are likely to affect the root protection zone. Furthermore, there is also likely to be some felling of scattered trees near the watercourses between the A83 Trunk Road and the OMR. This is to facilitate potential engineering solutions associated with ground stability on the upper extents of some of the watercourses. Mitigation planting of scattered trees will be undertaken as a result of this as discussed in Volume 2, Chapter 9: Landscape and shown in Figure 9.3. National Planning Framework 4 (NPF4) Policy 6, further information on this is included in Section 2.4 of Volume 2, Chapter 2: Need For the Proposed Scheme, has been checked but these trees are not part of the Ancient Woodland Inventory or veteran trees. This is further considered in Volume 2, Chapter 9: Landscape of this EIA Report.

Embedded Mitigation

4.2.46. As the design of the project has evolved, measures have been incorporated into the project design in order to avoid or prevent adverse environmental effects. These measures are referred to as ‘embedded mitigation’ and are taken into account in this EIA Report before determining potential impacts. Table 4.2 collates and summarises the embedded mitigation measures included in the design and.

Table 4.2 - Embedded mitigation measures

Ref	Description
MAD-Embed 1	The design of the Proposed Scheme includes an extension to the HESCO barrier, the installation of debris flow and rock fall fences above the A83 Trunk Road and debris flow protection earthwork bunds to reduce the vulnerability of the Proposed Scheme to landslides. The design also includes measures to reduce the vulnerability of the Proposed Scheme to fluvial flooding including the installation of culverts to convey watercourses. Embedded mitigation measures also include a programme of hazard studies (such as road safety audits) to produce an inherently safe design and to ensure residual risks are managed to be ALARP. Measure was identified during the EIA Screening / Scoping, refer to Volume 4, Appendix 6.1 Summary of EIA Scoping.
PHH-EMB-1	With respect to paths (informal or formal), these will be realigned as close to their original alignment as practical to avoid extending WCH routes, where possible.
PHH-EMB-2	Where the Proposed Scheme would affect existing paths, replacement network provision would be made to ensure routes remain open by providing suitable crossing points or diversions.
PHH-EMB-3	Where new paths are required, they would be designed to be as fully accessible as possible. Of note, a new Active Travel Link is included in the Proposed Scheme and will link the Rest and Be Thankful Car Park / Viewpoint to forest trails and core path to the west of the OMR.
GSG-Embed1	The footprint of the existing OMR has been utilised as much as possible, which minimises both the land take required and cuttings into the hillside, hence reducing the potential impact on soils (including carbon rich soils such as peat) and groundwater receptors.

Ref	Description
GSG-Embed2	It is proposed to retain existing OMR filter drains and ditches, as agreed in principle with SEPA during the A83 ESG January 2024 consultation meeting, to minimise engineering interventions as a proportionate approach for the OMR to be used as a temporary route.
LV-Embed 1	The HESCO barrier extension will match the colour of the existing HESCO barrier as far as possible.
RDWE-Embed1	Watercourse crossings, designed to convey the 50 year design flow, with catchpits at inlets and freeboard of D/4 to be adopted. These will involve upgrades, where necessary, to existing structures. Measure was identified during the EIA Screening / Scoping, refer to Volume 4, Appendix 6.1 Summary of EIA Scoping.

4.3. Construction

4.3.1. This section provides an overview of the anticipated construction programme and typical construction activities.

4.3.2. This section sets out a possible construction sequence for the Proposed Scheme. However, the design and construction process adopted by the Appointed Contractor may vary from that described in this outline methodology. The Appointed Contractor would be permitted to change the construction process, timescales and duration of each works element provided that environmental impacts are not significantly different than those described in this EIA Report, and that commitments given in the EIA are adhered to (or measures providing equivalent mitigation, subject to agreement with Transport Scotland and the A83 Environmental Steering Group, as required).

Construction Period

4.3.3. The EIA assumes that construction will have an estimated 12-month duration following appointment of a Contractor, based on a continuous working approach. However, this may be subject to potential interruption and extension either due to:

- the OMR being required as a diversion route when the A83 Trunk Road is or has the potential to be impacted by a landslide or debris flow event, or
- a landslide or debris flow event reaches the OMR itself, disrupting, and potentially suspending construction activities.

Construction Programme

4.3.4. The Appointed Contractor will be required to provide a detailed programme prior to commencement of the works. This will set out:

- the overall period of construction
- programming of the key elements and phases of construction, and
- the duration of each element and phase.

4.3.5. The programme will be required to be regularly updated to reflect any changes in programmed activities and will provide the basis for notification to landowners and local communities where sensitive activities would be likely to involve temporary disturbance to access or non-routine events.

4.3.6. The construction programme is complicated by the fact that the OMR may need to be used by trunk road traffic with relatively short notice during times of elevated debris flow risk which will be determined through continual monitoring. At present, monitoring includes weather forecasts, hillside conditions through inspection, level of water saturation, instrumentation measurement, timelapse photography and hillside spotters.

4.3.7. Given the risk, it would be beneficial for the Appointed Contractor to identify those elements of work / durations that would prevent the OMR being used. For example, the widening of the Bridge B structure or the installation of twin culvert structures where road plates would not be suitable. Where possible, the Appointed Contractor should programme these away from wet weather periods and have contingencies to be able to reinstate the route as soon as practicable such as the use of quick drying concrete or the erection of a temporary concrete parapet.

Outline Construction Programme

4.3.8. Initial constructability reviews have indicated that construction could be sub-divided into three distinct works sections. The phasing and programme of the works will be the responsibility of the Appointed Contractor where they may choose to advance a single workfront or on multiple fronts. It is expected that the Appointed Contractor will work in parallel for some activities given their isolated nature. There will be some time for mobilisation and demobilisation in addition to the works within the programme:

- Section 1 (anticipated to be approximately 10 months) –From Ch. 450m to the end of the proposed HESCO Barrier at Ch. 2,660m. This section includes the majority of the works including the two-way and localised widening, associated road infrastructure, drainage, structures and culvert improvements, earthworks bund, HESCO barrier and channel reprofiling.
- Section 2 (anticipated to be approximately four months) – Immediately north of the proposed HESCO Barrier at Ch. 2,660m to where the OMR connects to the A83 at Ch. 3,960m. This section includes localised, targeted improvements at the three sharp bends. Notably, carriageway widening as well as drainage, structure and culvert improvements.
- Section 3 (anticipated to be approximately nine months) – Quarry adjacent to the A83 Trunk Road at approximate Ch. 2,120m. This sits independent of the OMR and could potentially be completed in parallel with either Section 1 or Section 2. This section includes targeted geotechnical improvements. Notably, an earthworks bund and debris flow fencing.

4.3.9. Due to the narrow, linear nature of the corridor with access limited from either the northern or southern ends, sub-dividing the works will help reduce construction challenges of the subsequent sections. Furthermore, it is also considered that this may assist in the management of quickly implementing a diversion route should the A83 Trunk Road require to be closed at short notice.

Typical Construction Activities

4.3.10. Key construction activities associated with the Proposed Scheme are indicated in Table 4.3, below.

Table 4.3 - Indicative Construction Activities

Section	Construction Activities
Potential Advance Works	• Environmental mitigation • Utility Apparatus / Service diversions • Archaeological investigations and excavations
Roadworks	• Site establishment and plant compounds at strategic locations • Permanent fencing including accommodation works fencing • Site clearance and demolition • Temporary and permanent surface water outfalls • Utility Apparatus / Service diversions • Temporary pre-earthworks drainage and permanent cut-off drainage • Earthworks (cuttings and embankments) • Earthworks Bunds • Landscaping • Drainage, service ducts and chambers • Topsoil spreading, seeding and turfing • Pavement construction • Roadwork finishes including signs, road markings and traffic calming measures • Accommodation works

Section	Construction Activities
Structures	• Installation of Bridge D • Widening of Bridge B • Extension of HESCO Barrier • Culvert improvements (extension and new construction) • Installation of debris flow fences
Environmental	• Landscape and ecological mitigation planting • Permanent diversion of watercourses
Temporary Works	• Temporary works to facilitate Bridge D implementation • Temporary carriageway to maintain implementation of diversion route • Temporary Traffic Management • Temporary diversion of watercourses to facilitate culvert construction • Temporary outfalls • Temporary fencing to facilitate construction
Maintenance	• Landscape maintenance • Remedial works as a result of landslides or debris flow events during construction • Other routine maintenance and defects repair works

Working Hours

4.3.11. Normal working hours are expected to take place between 07:00 – 19:00 Monday to Friday and 07:00 – 13:00 Saturday. No Sunday or public holiday working is currently anticipated.

4.3.12. The Appointed Contractor may wish to carry out certain operations outside of the expected working hours. For example, oversize deliveries, junction tie-ins, works above the A83 Trunk Road at the quarry or for traffic management reasons. These hours may need to be restricted and considered on a case by case basis.

4.3.13. Furthermore, the Appointed Contractor may seek to extend working hours in the summer months to take advantage of better weather conditions and longer daylight hours given the inherent debris flow risk which is heightened by high rainfall.

4.3.14. Such extensions beyond normal working hours would be dependent on the Appointed Contractor's proposed methods of construction, and subject to agreement with the Trunk Road Operating Company, Transport Scotland and Argyll and Bute Council. Liaison with the local community, businesses, and other key stakeholders, such as Loch Lomond and Trossachs National Park Authority and Police Scotland, would also be required.

Land Requirements

4.3.15. All construction work, excluding accommodation works, will take place within the limits of the land made available (LMA) to the Appointed Contractor as defined within the contract documents. The LMA has informed the land take and habitat loss calculations undertaken for this EIA. This includes land for all the permanent works and implementation of the Biodiversity Net Gain and Natural Capital areas. Land for earthworks storage has not been identified within the LMA as this will be a matter for the Appointed Contractor to determine based on their construction methodology and the mitigation principles set out in the EIA Report. The final LMA would include land acquired under Compulsory Purchase Order (CPO) and land to which the Scottish Ministers already have ownership of or access to, and other areas the Appointed Contractor has acquired to facilitate construction.

4.3.16. The land to be acquired includes land necessary to construct, operate and maintain the Proposed Scheme and associated infrastructure and to undertake essential environmental mitigation measures. However, the Appointed Contractor may (depending on the phasing and execution of works) determine the need for additional areas of land such as for site compounds, topsoil storage areas and other areas required for construction. Should land be required outside of the land made available, this would be secured through separate agreement/planning permission by the Appointed Contractor. As the requirement and potential location of such areas is currently unknown, it has not been possible to include an assessment of the effects of them within the EIA Report.

Construction Site Compounds, Site Offices and Storage Areas

4.3.17. To facilitate the construction works, the Appointed Contractor will require to create site compounds to house offices, stores, car / plant parking and construction working areas. While topsoil stripping and storage is typical in road schemes, it is unlikely that it will be required for the Proposed Scheme due to it being a thin layer in many locations, or not present at all, and likely removed as part of the bulk earthworks excavation.

4.3.18. It may be necessary for the Appointed Contractor to negotiate separate agreements with landowners to provide land temporarily for the duration of the works for compounds to be located.

4.3.19. The exact location of site offices has not been determined, nor assessed as part of this review as these will be considered by the Appointed Contractor at a later stage in line with the stipulations imposed by the Contract, EIA and with cognisance of the planning requirements of the Loch Lomond and Trossachs National Park Authority. It is considered that there are several suitable locations in the vicinity of the Proposed Scheme.

4.3.20. For the works within the quarry adjacent to the A83 Trunk Road, there may be benefits of siting a satellite office due to its isolation from the wider works of the Proposed Scheme.

4.3.21. Where practicable, the Appointed Contractor's site offices, compounds and storage areas should be located close to the proposed works where there is suitable access and potential environmental impacts are minimised.

4.3.22. When establishing construction compounds, the Appointed Contractor will generally strip topsoil, if present, and cover the area with compacted granular material to establish an area of hard standing to accommodate the offices, car parks and welfare facilities. Main compounds will generally require connections to mains water, foul water, electricity and telecommunications networks. Given the rural nature of the Proposed Scheme and limited existing services, it may be necessary for the Appointed Contractor to consider off-grid solutions.

4.3.23. Following completion of construction, compounds or temporary construction areas within the LMA will be reinstated by the Appointed Contractor in accordance with the contract and EIA requirements. Areas acquired by the Appointed Contractor outside the LMA will be reinstated to the satisfaction of the affected landowner and Local Planning Authority as required.

Construction Environmental Management Plans

4.3.24. The environmental performance of the Appointed Contractor throughout the works will be defined and controlled through an overarching Construction Environmental Management Plan (CEMP), which shall be developed by the Appointed Contractor. The CEMP will comply with current legislation, regulations and industry best practice, and require consultation with statutory consultees where relevant.

4.3.25. The CEMP will outline the measures to minimise and mitigate the construction impacts of the Proposed Scheme in accordance with the EIA Report. The CEMP will be developed to:

- define how the Appointed Contractor and any associated parties shall implement the committed environmental mitigation measures (as defined in Chapter 12 Schedule of Environmental Commitments) to minimise any adverse impacts to the environment;

- document how the detailed design process, materials selection, construction techniques, and operational methods shall minimise adverse impacts to the environment;
- establish and maintain high environmental standards;
- avoid environmental accidents and pollution;
- encourage reduced consumption of resources, and restrict the production of waste; and
- promote good relationships with the relevant authorities and other key stakeholders including affected landowners.

4.3.26. Commitments made regarding mitigation measures, their implementation and subsequent monitoring shall be recorded by the Appointed Contractor. The mitigation measures recorded in Chapter 12: Schedule of Environmental Commitments and the Medium-Term Solution Report to inform Habitats Regulations Appraisal (Transport Scotland, 2024) Habitats Regulations Appraisal shall be included and considered as 'Compliance Obligations'.

4.3.27. Notwithstanding any other commitments the CEMP shall:

- document and demonstrate how the proposed methods of construction shall restrict impacts to the best practicable environmental option;
- set out contingency plans and emergency procedures;
- include liaison with the local community and landowners; and
- include environmental training for all site personnel, including sub-contractors and suppliers, including specific environmental inductions and 'toolbox talks'.

4.3.28. The Appointed Contractor will ensure that environmental considerations are included in risk assessments, method statements, work instructions and field control sheets and will ensure these are communicated to those undertaking the work. No work will commence on site before method statements and risk assessments have been approved by the appropriate person. The Appointed Contractor's Environmental Manager/Clerk of Works will be responsible for co-

ordinating and managing all environmental activities during the construction phase.

4.3.29. The Appointed Contractor will develop and maintain a CEMP that shall include, numerous plans related to the protection of environmental receptors during the construction period as detailed in Chapter 12: Schedule of Environmental Commitments. Volume 4, Appendix 4.2 First Iteration Environmental Management Plan has been produced in accordance with DMRB LA 120 Environmental management plans and sets the framework for the Appointed Contractor to further develop their CEMP.

4.3.30. All activities on site will be reviewed against the requirements of the CEMP via an integrated risk assessment and method statements procedure. The Appointed Contractor will review environmental risks associated with the construction process and appropriate control measures included in method statements and field control sheets.

4.3.31. Regular audits will be completed by the Appointed Contractor to verify that the project is compliant with the established CEMP, contractual requirements and legislation.

4.3.32. The Appointed Contractor's Environmental Manager/Clerk of Works will carry out regular assessments of the project's environmental performance.

Traffic Management

4.3.33. The Contractor will be required to develop and agree a Traffic Management Plan (TMP) with Transport Scotland and the Trunk Road Operating Company, Police Scotland, and Argyll and Bute Council and other directly affected stakeholders for the duration of the contract. The plan will identify proposals for the principal phases of the works and individual construction activities which will potentially involve disruption to existing vehicular and pedestrian access in specific locations along the construction corridor.

4.3.34. The majority of the works for the Proposed Scheme are offline either on the OMR or within the quarry. Therefore, it is anticipated that traffic management will be limited to the interfaces with the A83 Trunk Road and predominantly managing safe access and egress for construction or local traffic, such as landowners.

4.3.35. Notwithstanding the above, the TMP will need to account for a scenario where trunk road traffic is diverted onto the OMR as a result of a closure of the A83 which may require public traffic running adjacent to the works. The Appointed Contractor should be prepared for quick cessation of any live works and traffic management set up. It is likely that the TMP will require to be regularly reviewed and updated as the programme progresses.

Earthworks Balance and Material Requirements

4.3.36. The Proposed Scheme includes extensive earthworks. While it has been designed to minimise the impact on the surrounding topography, the earthworks are predominately sections of cutting which are of significant size with limited embankment construction. Therefore, there is a notable imbalance in the cut / fill ratio.

4.3.37. Existing information suggests that the materials that will be excavated in areas of proposed cut as part of the two-way widening works or the channel reprofiling works are generally relatively wet and can contain relict soil layers. Separating the topsoil layer will also be difficult due to the undulating, irregular topography and this may lead to further entrainment of organic materials. As such, as dug materials are unlikely to comply with the requirements of Class 1 or 2 General Fill for re-use in the sections of widening on embankment. The re-use of excavated material may be limited to Class 4 fill for landscaping areas with shallower slopes. As such, engineered materials and additional quantities will need to be imported to site.

4.3.38. A ground investigation for the Proposed Scheme has been procured, site works are now complete with factual reporting ongoing. As such, the factual reporting and findings from the ground investigation are not currently available at the point of publishing the EIA Report.

4.3.39. Major earthworks are required to accommodate the widening of the carriageway to the east of the existing OMR, the HESCO barrier extension, the proposed earthworks bund and channel reprofiling works.

4.3.40. Other earthworks movement will be needed to construct the new drainage systems, including ditches.

4.3.41. The principal earthworks process involves excavation of soils in cuttings and transportation of the excavated soil to neighbouring zones where embankments are required. Deposition in the fill areas will be built up by depositing the material and using bulldozers to place it in layers which are then compacted by rollers. This process is repeated until embankments are built to the road formation level.

4.3.42. A summary of the estimated quantities (based on the engineering assessment) is detailed in Table 4.4, Table 4.5 and Table 4.6.

Table 4.4 - Summary of Estimated Excavation Quantities

Soil Class	Quantity (m^3)
Acceptable excavation	*(See 4.4.43)*
Unacceptable excavation	16,095
Topsoil	*(See 4.4.44)*
Total	16,095

4.3.43. From the information available, the quality of the material that will be excavated is considered unacceptable for re-use as general fill at this point; however, the material may be suitable for re-use as landscape fill.

4.3.44. Furthermore, this information also suggests that where topsoil is present, it is typically a thin layer. Therefore, it is expected that it will be excavated as part of the bulk earthworks rather than a typical topsoil strip operation.

Table 4.5 - Summary of Estimated Fill Quantities

Soil Class	Quantity (m^3)
Acceptable Fill	26,250
Topsoil	2,750
Total	29,000

Table 4.6 - Summary of Estimated Earthworks Balance

Import/Export	Quantity (m^3)
Estimated Import	29,000
Estimated Export	16,095

4.3.45. For the purposes of the estimated earthworks balance, a worst-case scenario has been assumed where all excavated material will be unusable and require to be exported, and all fill material will require to be imported. Following receipt of further ground investigation information, opportunities for reuse and reducing the balances will be better understood.

Disposal and Import of Materials

4.3.46. The identification of approved receptor sites for the disposal of any excess materials associated with earthworks that is unsuitable for re-use and the import of bulk materials required to make up design levels will be the responsibility of the Appointed Contractor. The Appointed Contractor will be required to meet all legal obligations relating to licensing and planning approvals.

4.3.47. Where such import and export of materials is required, haulage routes will be subject to agreement under the required project TMP. Specific consideration will be given to the potential sensitivity of communities located along potential haul routes.

Construction Phase SuDS

4.3.48. Erosion and sediment control methods will be detailed within the CEMP as part of the Appointed Contractor's temporary works to suit their proposed construction phasing and works programme. The Appointed Contractor will be required to consult with SEPA and obtain the Construction Site Licence.

4.3.49. It is assumed that some or all of the following measures will be carried out as part of a comprehensive erosion and sediment control plan during construction:

- Clearly defined responsibilities and roles to manage erosion and sediment on site, including out-of-hours support and regulatory contacts.
- Agreed expectations of thresholds for total suspended solids (TSS) as a maximum sediment level allowable for discharge to surface waters, furthermore, consideration of threshold levels for in-channel sediment levels taking account of baseline conditions (i.e. sediment uplift from the development).
- Construction of pre-earthworks diversion drains / ditches and potentially damming and over-pumping of upslope watercourses to minimise water ingress from both hillslope and channels onto mid-slope construction zones.
- Construction of collection drains (downslope of or within disturbed areas), bunds, & slope drains where required, to convey runoff, by gravity or via pumping, to sediment basins or other storage locations or devices.
- Construction of settlement basins where topography allows, to provide for temporary retention of runoff from disturbed areas, these shall not be positioned within areas susceptible to flood risk and maximise distance from watercourses shown on OS 1:25,000 scale mapping (at least 10 m, with larger offsets difficult to achieve due to frequency of channels along project footprint).
- Where settlement requirements are unlikely to be achieved by standard settlement basins, such as within the limited space of the catch-pit, alternative techniques shall be employed which may include individual or a series of mechanical settlement devices to enable local discharge. These devices are portable and would be re-deployed at appropriate locations to manage construction sedimentation risk as the construction programme progresses.

- Construction of other source control methods, such as sediment fences and straw bale filters (downslope of disturbed areas and stockpiles) as required.
- Consideration of filter strips of retained vegetation between discharge point and entry into receiving watercourse.
- Flocculant additives may be necessary to be applied, to augment settlement performance of settlement basins and/or mechanical devices (or other methods). The specific additive(s), methodology and circumstances for application shall be intended to be pre-agreed with SEPA and other regulators, to minimise delay and adverse environmental effects where pre-requisite circumstances are met.
- Consideration shall also be given to collection and transfer off-site of sediment-laden runoff that cannot be adequately treated and discharged to local channels. In such circumstances, receptor sites for further treatment or discharge would be pre-agreed with regulators including SEPA.

4.3.50. It is recognised that the Appointed Contractor may use a different approach to the management of construction surface water and sediment control, however the Appointed Contractor is required to manage construction surface water and sediment in an appropriate manner within the Proposed Scheme boundary.

4.4. Operation and Maintenance Proposals

Operation

4.4.1. Following completion of the Proposed Scheme, it is expected that the Trunk Road Operating Company will be responsible for the operation of the OMR. As the purpose of the MTS is to improve resilience as an emergency diversion route, it will only come into operation when the A83 Trunk Road is closed. It is anticipated that this will continue to be managed, monitored and brought into operation as per the current Trunk Road Operating Company Landslide Management Plan and operated under temporary traffic management.

Road Maintenance

4.4.2. Despite the temporary nature of the MTS, regular maintenance operations will still be required to ensure the effective operation of the route such as cut off ditch clearing; gully, pipe and chamber cleansing; sign face cleaning and winter maintenance.

4.4.3. The LMA for the MTS has been prepared such that it can accommodate both the initial construction and future maintenance requirements of the Proposed Scheme. Land acquisition has been kept to a minimum on the premise that where earthworks adjacent to the OMR are low or at grade, maintenance operations will be carried out from the carriageway. Where earthworks are more significant, a 3m maintenance strip is provided at the toe or crest of the earthworks to allow suitable access for a vehicle.

Structures Maintenance

4.4.4. It is expected that Bridges A, B and C will be maintained in a similar manner to present. The proposed Bridge D will be a proprietary structure which are typically designed to be easily maintainable and will include safe methods of access to allow inspection of the sides and beneath the bridge deck. For Bridge B, it is expected that the Trunk Road Operating Company will apply their standard approach for inspection and maintenance regimes on structures while taking cognisance of any advice and guidance provided by the proprietary bridge manufacturer.

4.4.5. All culverts will have access for operatives to carry out maintenance and inspection safely. Vehicular access for maintenance of structures will be provided from the OMR itself given the restriction of public traffic unless operating under a diversion. Culverts with drop structures behind the HESCO barrier or earthbund will be accessible via a maintenance track.

4.4.6. The existing HESCO barrier is subject to periodic inspections in accordance with the Trunk Road Operating Company's inspection regime, to identify any damage or changes to the barrier. Special inspections are also required as outlined below:

- visual inspection after intense rainfall / channel flow due to the risk of erosion to the back of the barrier
- full inspection post landslide event to identify any damage

4.4.7. With regard to access, it is expected that inspections and maintenance will be carried out from the OMR or via a maintenance track to the rear.

Debris Clearance

4.4.8. In the instance that debris does reach the OMR following a landslide or debris flow event, material will need to be cleared by the Trunk Road Operating Company. The size of the event will predominantly dictate the approach to the operation; however, this may be undertaken from the OMR itself using long-reach plant or via the access at the rear of the HESCO barrier. Where debris accumulates behind the earthbund, a 3m maintenance track along the top has been provided which can be accessed from either end to carry out clearance operations.

4.5. Biodiversity Net Gain and Natural Capital Areas

4.5.1. The Proposed Scheme follows a combined Biodiversity Net Gain (BNG) and Natural Capital approach. The Proposed Scheme has various policy drivers concerning biodiversity enhancement and Natural Capital. These drivers comprise specific requirements under NPF4 (Policies 3a, 3c and 3d) to protect biodiversity, reverse biodiversity loss, deliver beneficial effects from development and strengthen nature networks. Moreover, 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*."

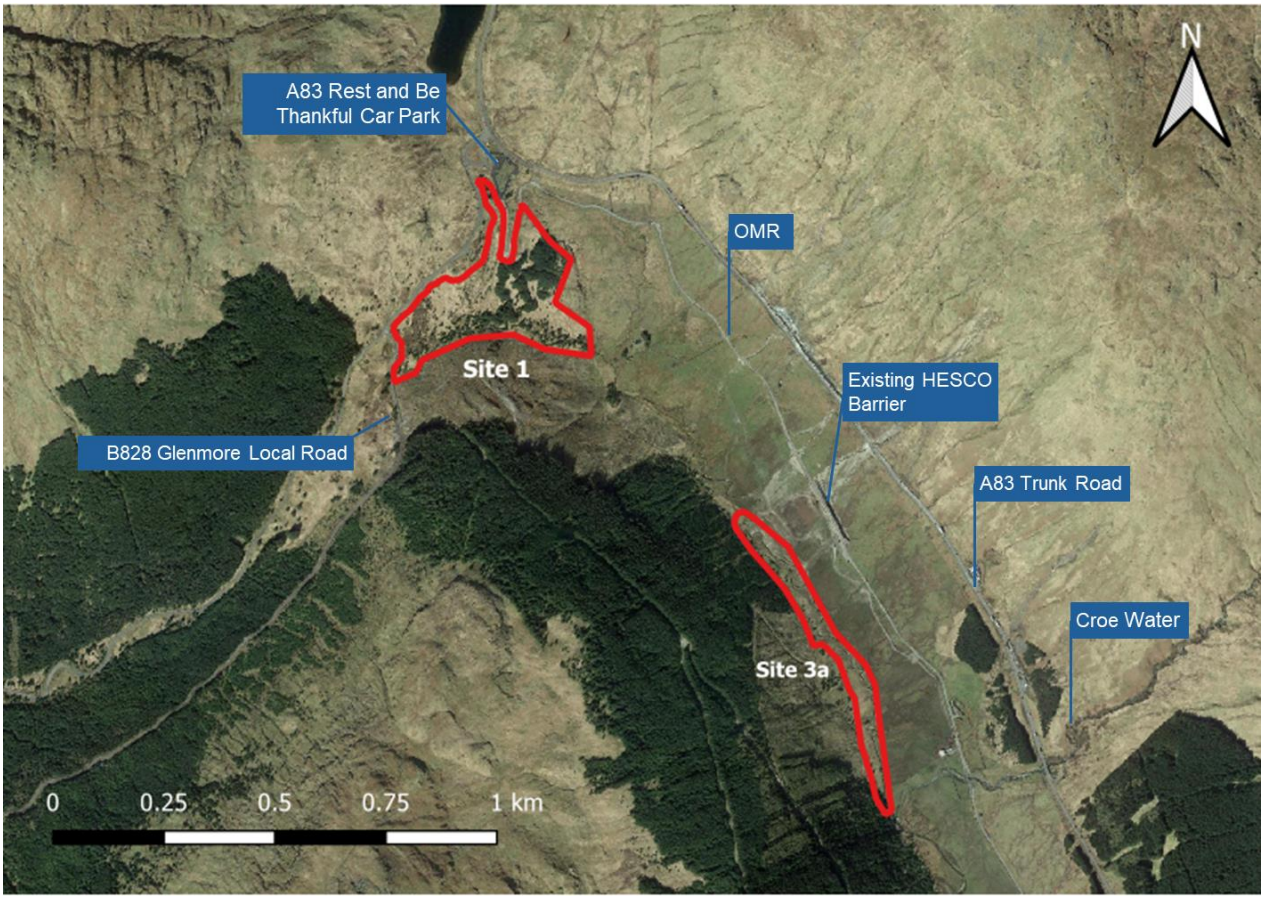
4.5.2. To deliver on the BNG and Natural Capital requirements, two approaches have been followed. First, habitat creation and enhancement of retained habitats on-site within the Proposed Scheme where possible. Secondly, the identification of enhancement sites in proximity to the Proposed Scheme. Sites were identified through consultation with FLS as one of the main landowners in the area local to the Proposed Scheme.

4.5.3. Outline designs have been produced for the enhancement sites. These provide indicative locations for habitat enhancements and creation. As the project progresses detailed habitat management plans including maintenance requirements 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 sufficient 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.

4.5.4. The following section presents a summary of the current state (baseline) and the proposal (post development) of the two enhancement sites (Site 1 and Site 3a) identified for the MTS. Plate 4-1 presents the BNG / Natural Capital sites.

4.5.5. The complete BNG and Natural Capital Assessments for the MTS enhancement sites and the Proposed Scheme are presented in Volume 4, Appendix 4.1 Biodiversity Net Gain / Natural Capital Assessment, including a summary of the methods by which habitat condition is assessed.

Plate 4-1 – MTS BNG and Natural Capital Enhancement Sites



Site 1

4.5.6. Site 1 is approximately 8.1 hectares (ha) in size, located immediately south-west of the Rest and Be Thankful car park. Site 1 currently comprises a mosaic of habitats, dominated by purple moor-grass and rush pasture in moderate-good ecological condition, upland heathland in poor-moderate condition and coniferous plantation woodland in poor condition. The coniferous woodland covers the central area of the site and comprises non-native dense Sitka spruce plantation. Site 1 includes 0.7km of watercourse habitat in fairly good condition, on account of its natural planform, riverbed and riverbank.

4.5.7. For Site 1 it is proposed that all Sitka spruce plantation, including young regenerating woodland, and any dense Sitka spruce needle litter and brash that could limit broadleaved woodland creation, is removed whilst minimising soil disturbance. Bracken and small areas of scrub which are of lower ecological value will be retained. In the locations where the plantation woodland is removed, an open mosaic of native broadleaved woodland will be created, across the felled footprint, targeted to achieve 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.

4.5.8. The mosaic of purple moor-grass and rush pasture and fens will be retained with the presumption that enhancement of the habitat condition would be achievable as a result of the removal of Sitka spruce. This is likely to result in local changes to the water table that could lead to a beneficial level of increased wetting of such habitats. 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 due to a reduction in shade and smothering by needle litter and brash. It is expected that the habitat interventions will provide aquatic habitat condition as well as limited uplifts for natural capital.

Site 3a

4.5.9. Site 3a represents a 0.99km reach of the Croe Water towards the northern end of Glen Croe, with enhancements proposed for habitats within 20m of the watercourse. The habitats within the buffer zone currently comprise a mosaic of purple moor-grass and rush pasture, fens, and neutral grassland – all in moderate-good condition, as well as a small area of coniferous woodland in poor condition. The watercourse habitat has been assessed as being in fairly good condition.

4.5.10. The proposed interventions for Site 3a include the retention of the majority of the grassland and wetland habitats as they are of very high distinctiveness / biodiversity value. These will be enhanced to good condition by a reduction in sheep grazing pressure within grassland areas to permit a more varied sward structure to develop, removal of excessive thatch in purple moor-grass and rush pastures in targeted areas.

4.5.11. Within the remaining riparian margins of these habitats, low density native broadleaved 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 in moderate condition along the riverbank. In combination with the removal of all 0.07ha of 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. Fencing or other measures may be necessary to protect newly developing woodland from deer and sheep grazing. Removal of any invasive non-native species (INNS) such as rhododendron, and regenerating Sitka spruce, shall also be undertaken within this Site. It is expected that the habitat interventions will provide aquatic habitat enhancements as well as a limited uplifts for Natural Capital.

Enhancement Sites Predicted Gains

4.5.12. The following table summarises the predicted gains achievable through the enhancement sites for BNG and Natural Capital.

Table 4.7 – Summary of Enhancement Sites Predicted Gains

Enhancement site	Habitat Units Achievable through Enhancement Sites	Watercourse Biodiversity Units Achievable through Enhancement Sites	Natural Capital score Achievable through Enhancement Sites
Site 1	+17.21	+3.76	+3
Site 2	+5.41	+7.49	+1
TOTAL	+22.62	+11.25	+4
Overall percentage change for Proposed Scheme plus enhancement sites	+5.32%	+14.06%	+13%

4.5.13. The BNG and Natural Capital assessments demonstrate 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 Proposed Scheme environment objectives. Both BNG and Natural Capital assessments demonstrate positive gains meaning that benefits can be achieved and clear biodiversity enhancement will be provided.