

5 The Proposed Scheme

5.1 Introduction

5.1.1 This chapter provides an introduction to the Proposed Scheme for assessment. It includes screenshots from the Project 7, Glen Garry to Dalwhinnie, visualisation tool used to inform public exhibitions. These images are presented for illustration purposes, and readers should refer to the Proposed Scheme **Drawings 5.2 to 5.8 (GIS layout)** and **Drawings 5.9 to 5.15 (Engineering Plan and Profile)**, provided in **Volume 3** of this report, which provide the most up-to-date information, including any design refinements since public exhibitions.

5.2 Proposed Scheme Overview

5.2.1 A high quality dual carriageway will be constructed along approximately 10km (9.5km plus tie-ins) of the A9 between Glen Garry to Dalwhinnie, replacing the existing single carriageway road. There will be no gaps in the central reservation, to prevent right-turn manoeuvres across carriageways. **Table 5-1** outlines the cross-section requirements for a rural all-purpose dual carriageway in accordance with the DMRB.

Table 5.1: Rural all-purpose dual carriageway cross section width requirements

Verge (m)	Nearside Hard Strip (m)	Carriageway (m)	Offside Hard Strip (m)	Central Reserve (m)	Offside Hard Strip (m)	Carriageway (m)	Nearside Hard Strip (m)	Verge (m)
2.5	1.0	7.3 (2x 3.65m lanes)	1.0	2.5	1.0	7.3 (2x 3.65m lanes)	1.0	2.5

Note - Verge and central reserve dimensions noted are minimum values; these may be increased to suit particular circumstances, e.g. forward visibility.

- 5.2.2 Cuttings and earthworks are required along the route and the size of these varies depending on local topography, stability requirements and any landscape design to blend with local landform. The total surface area of permanent works is estimated at approx. 113.5 hectares.
- 5.2.3 The vertical alignment has been raised where necessary to accommodate the road drainage system. Drainage layouts have been developed, including consideration of Sustainable Drainage Systems (SuDS) features, swales, watercourse crossings and diversions, ditches, and outfalls.
- 5.2.4 Where watercourse crossing structures are required (i.e. bridges), the level of detail assumes a main span sufficient to avoid permanent in-channel works. With respect to culverts, the principal design assumption is that existing culverts that are currently undersized (with respect to the Flood Estimation Handbook (FEH) estimation methods) will be upsized to accommodate a 1:200 year flow, unless other constraints dictate retention at smaller sizes.
- 5.2.5 The Proposed Scheme assumes that existing ‘cascades’ (i.e. hillside watercourses diverted or engineered to flow into existing culverts) could be further engineered to meet the required vertical alignment of the dualled route. In addition, vertical alignment changes require the introduction of a small number of new cascades on the upstream (east) side of the mainline.

5.3 Permanent Works – Mainline and Junction Infrastructure (Operational Phase)

- 5.3.1 Note that earthworks slopes in the images below show straight line gradients from top to bottom and, whilst these demonstrate the footprint/ extent of slopes, they do not incorporate any landform contouring or mitigation planting, e.g. trees or shrubs, nor do they show any of the earthworks associated with lay-by designs at Dalnaspidal and Drumochter.

Southern Tie-In at Existing Glen Garry Dual Carriageway – Chainage -950 to 0,200

- 5.3.2 **Figure 5-1** shows the horizontal alignment of the mainline tie-in to the existing Glen Garry A9 dualled section at the southern extent of Project 7, along with tie-ins to the existing NCN7 route to the west of the mainline. NCN7 will be locally widened to accommodate shared use for SuDS maintenance access, serving a number of SuDS features which are proposed to the west (downstream) side of the mainline. The northbound access to Dalnaspidal is also shown.

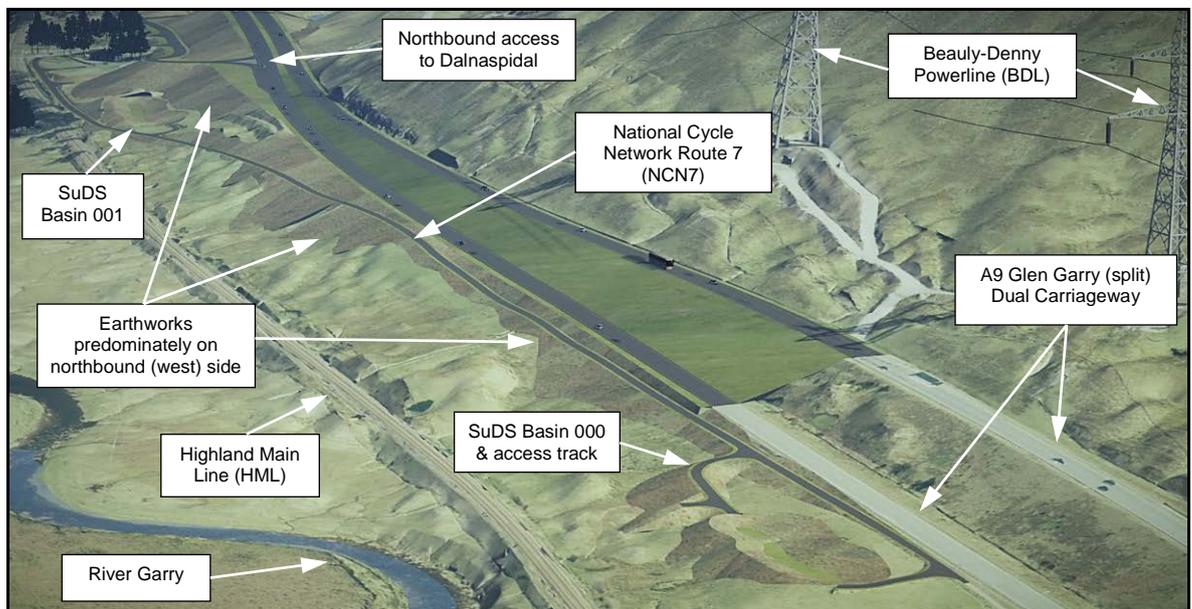


Figure 5-1: Approx. chainage -950 to 0,200
– Tie-in from existing split carriageway and northbound approach to Dalnaspidal

- 5.3.3 **Figure 5-2** below shows the horizontal alignment and layout of the Dalnaspidal Junction, looking south, including the northbound lay-by at approx. ch. 1,000.
- 5.3.4 The junction comprises a left-in/ left-out arrangement with local grade-separation, providing access to properties at Dalnaspidal to the west of the A9 and access to Dalnacardoch estate and the former General Wade's Military Road (GWMR) hill walking route to the east.
- 5.3.5 The A9 mainline vertical alignment is elevated above the junction link road to Dalnaspidal. The slip road from the northbound carriageway includes a new Allt Coire Mhic-Sith overbridge. An access track off the southbound loop serves Dalnacardoch Estate and the existing telecommunications mast.

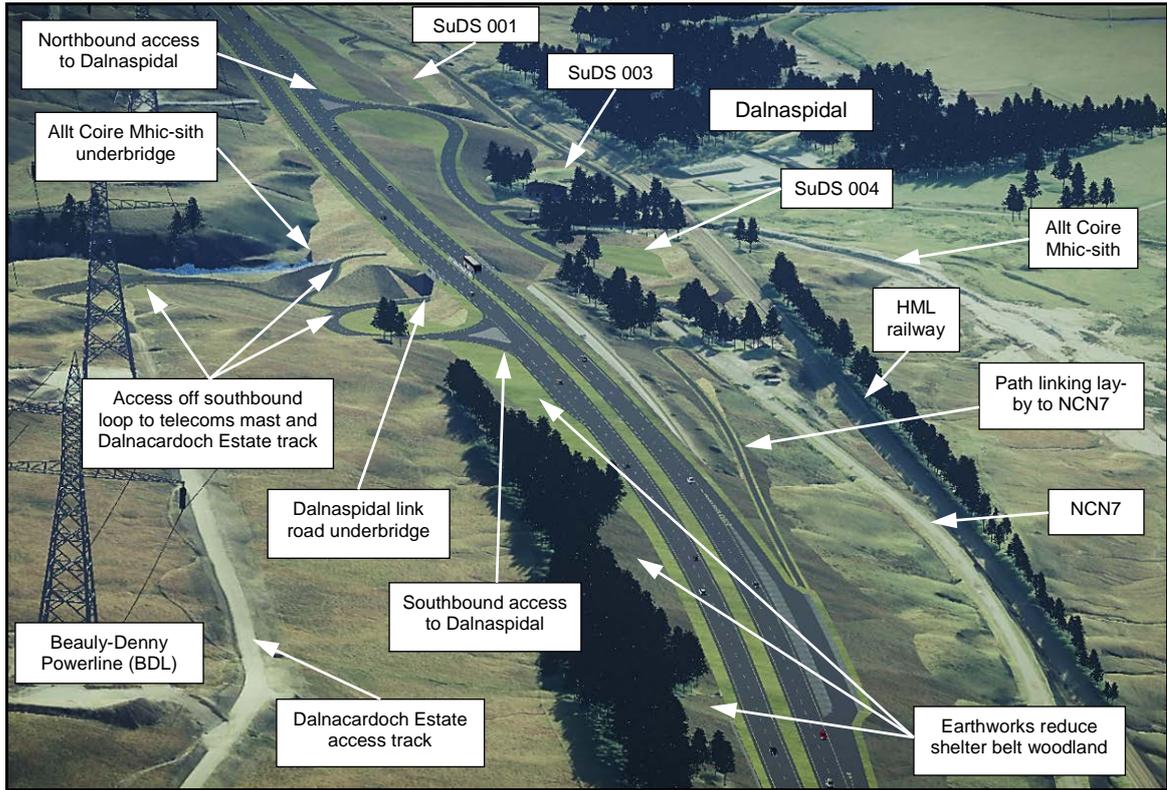


Figure 5-2: Proposed Dalnaspidal Junction

Mainline Alignment – Chainage 1,000 to 3,000

5.3.6

Figure 5-3 highlights the Proposed Scheme features from the northbound lay-by at ch. 1,000 through to approx. ch. 3,000. Maintenance access to SuDS basin 020 will be via the NCN7 (old A9 road). Retaining walls are shown on the southbound side to help reduce earthwork cuttings and minimise encroachment into the Drumochter Hills designated nature conservation site boundary.

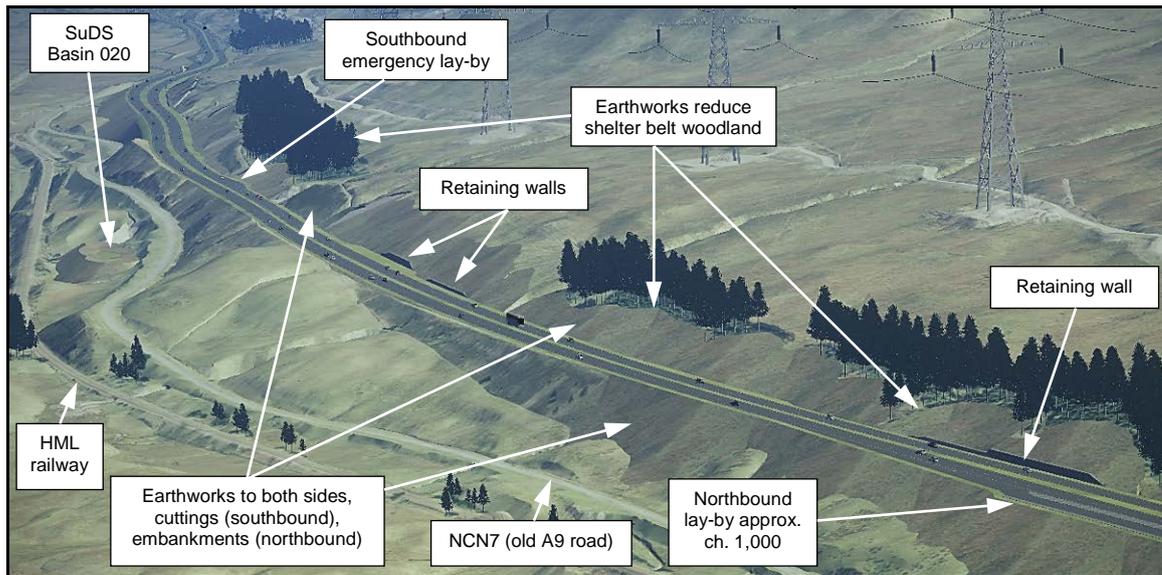


Figure 5-3: Approx. chainage 1,000 to 3,000

Mainline Alignment – Chainage 3,000 to 4,800

- 5.3.7 **Figure 5-4** highlights the Proposed Scheme features from approx. ch. 3,000 at the crossing of the Allt a' Chaorainn through to approx. ch. 4,800 at the Pass of Drumochter. An underpass link through the Allt a' Chaorainn crossing connects the NCN7 to the east side of the A9, providing access for estate management and NMUs.

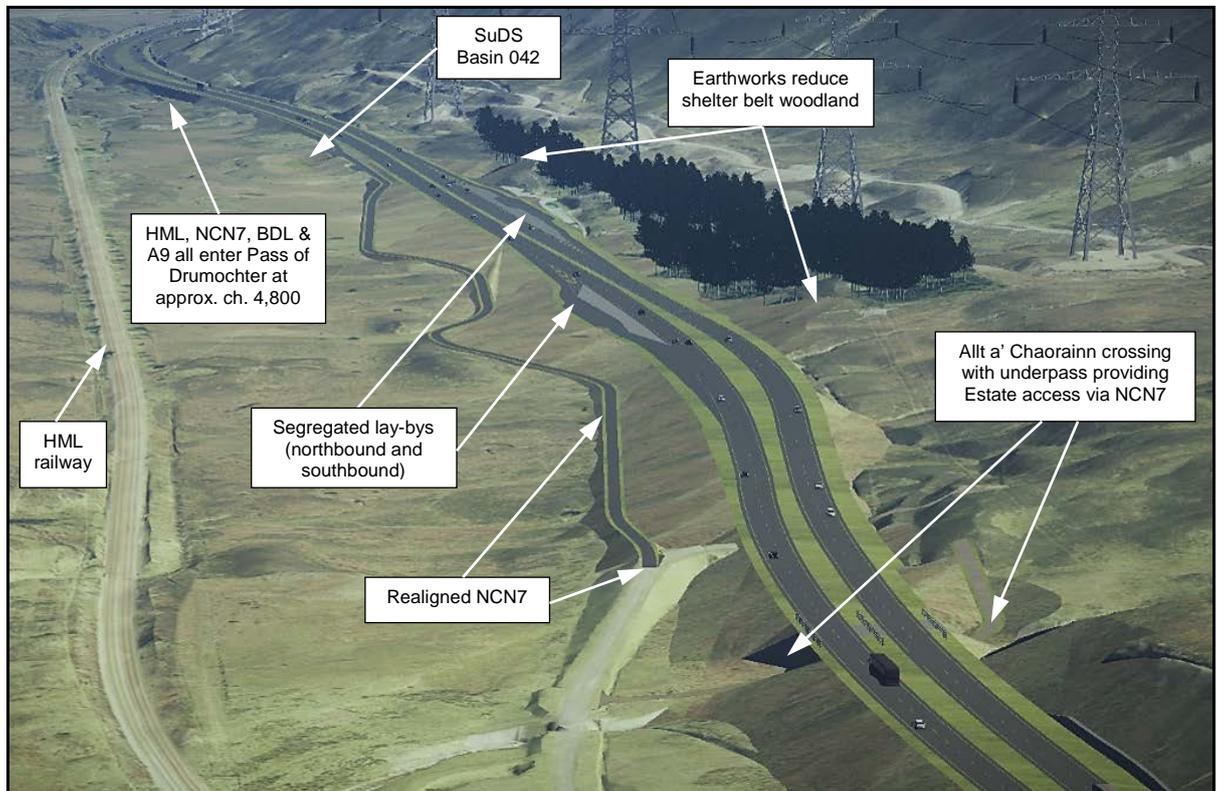


Figure 5-4: Approx. chainage 3,000 to 4,800

- 5.3.8 On the northbound (west) side, the existing NCN7 is rerouted due to wider dual carriageway embankments. Re-routing of the NCN7 has been informed by local topographic, watercourse, habitat and peat surveys, as well as flood plain extents. Segregated lay-bys are provided on both sides, with the southbound in a similar location to the existing/ current A9 lay-by.

Mainline Alignment and Drumochter Pass – Chainage 4,800 to 6,100

- 5.3.9 **Figure 5-5** uses three images, highlighting the complexities of the Proposed Scheme through the narrow Pass of Drumochter where the HML, BDL, NCN7, the River Truim and the A9 all compete for space. Space available for dualling is also constrained by safety exclusion zones applied to the HML railway and BDL either side. Images on the left look north, the image on the right looks south.
- 5.3.10 The vertical alignments of the NCN7 and the A9 carriageways vary through this section, with retaining walls required to limit earthworks encroachment into the BDL exclusion zone. A safety barrier is incorporated along the length of the northbound carriageway due to both its elevation above the NCN7 and its proximity to the HML boundary. The NCN7 is widened and re-routed to enable shared use for maintenance access to SuDS and to a telecoms mast.

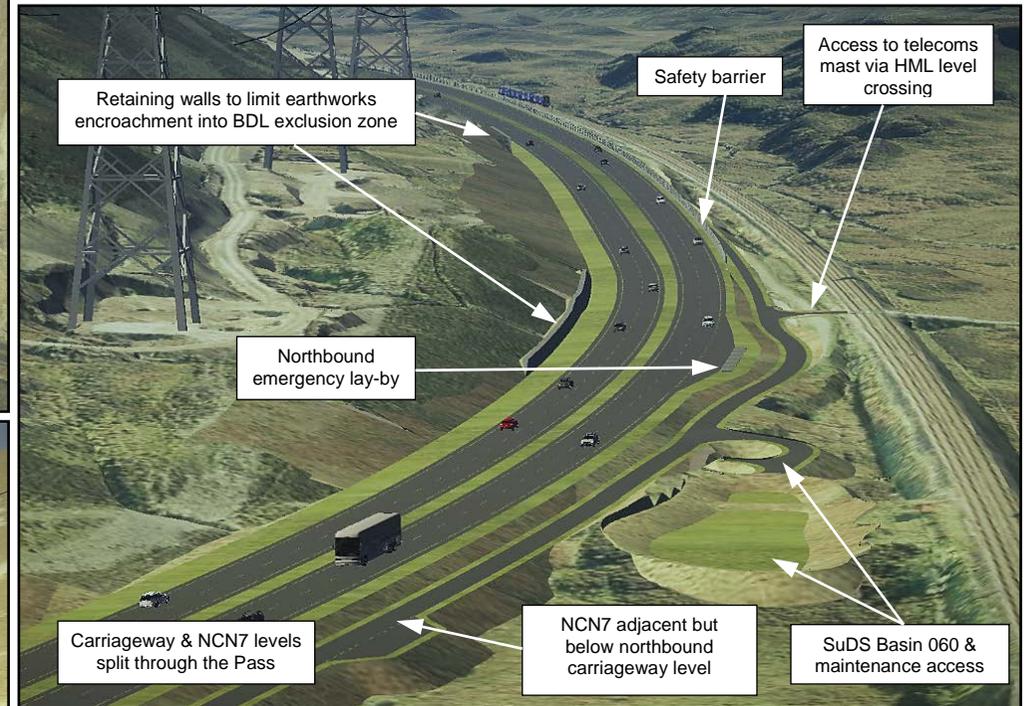
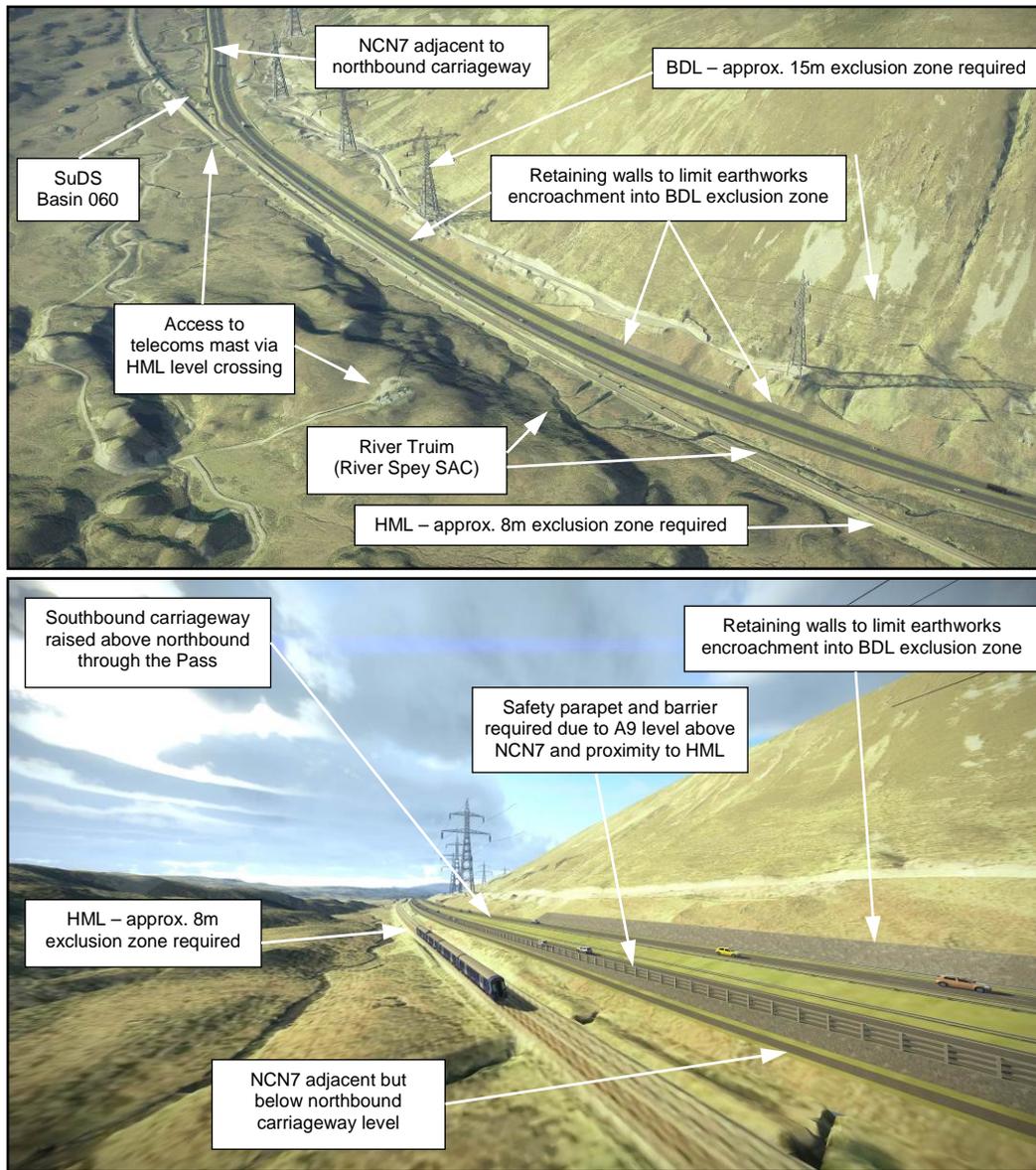


Figure 5-5: Through the Pass of Drumochter – approx. ch. 4,800 to 6,100

Mainline Alignment – Chainage 6,200 to 7,000

- 5.3.11 **Figure 5-6** shows three SuDS basins between the NCN7 and the River Truim (designated as part of the River Spey Special Area of Conservation (SAC)). SuDS are designed to intercept and treat road surface drainage before discharge to the receiving watercourse. The NCN7 is widened with passing places to enable shared use for SuDS maintenance access. An emergency lay-by is provided on the southbound carriageway.

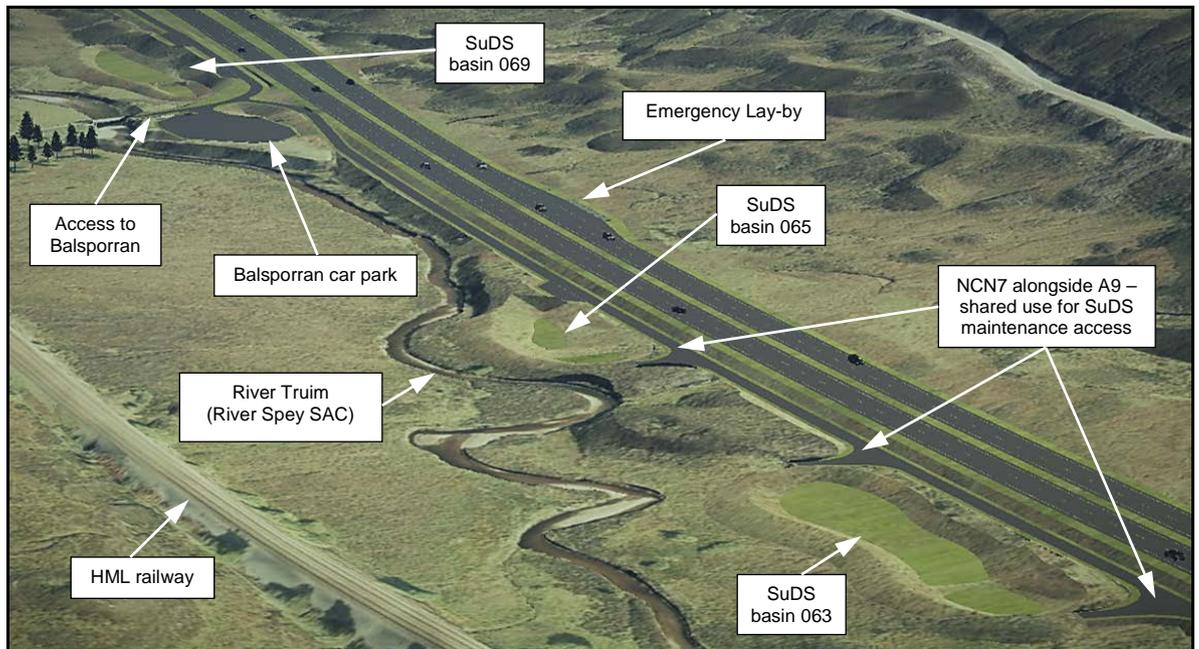


Figure 5-6: Approx. chainage 6,200 to 7,000

- 5.3.12 The existing car park off the access road at the entrance to Balsporran is included within the Proposed Scheme in order to retain connectivity for recreational users and to introduce surface runoff collection and treatment given its proximity to the sensitive River Truim receiving watercourse.

Balsporran Cottage/ Drumochter Lodge Access – Chainage 6,800 to 7,800

- 5.3.13 New accesses are required for Balsporran Cottages B&B and Drumochter Lodge/ Drumochter Estate. In order to remove right turn manoeuvres across carriageways, left-in/ left-out accesses are provided from each carriageway, linked by a local underpass at approx. ch. 7,550 as shown in **Figure 5-7** below. It should be noted that the vertical alignment of the A9 mainline will be raised to accommodate the link road underpass.
- 5.3.14 The northbound access and link road underpass also connects to NCN7, which will be locally realigned and widened, with passing places, to provide shared use for access to the Balsporran car park, Balsporran Cottages, for SuDS maintenance, and to the telecoms mast level crossing access previously discussed.
- 5.3.15 The southbound access loop includes a connection to Drumochter Lodge, as well as a link to the former BDL track; principally to provide alternative access for Drumochter Estate as other, existing direct accesses from the A9 will be closed.

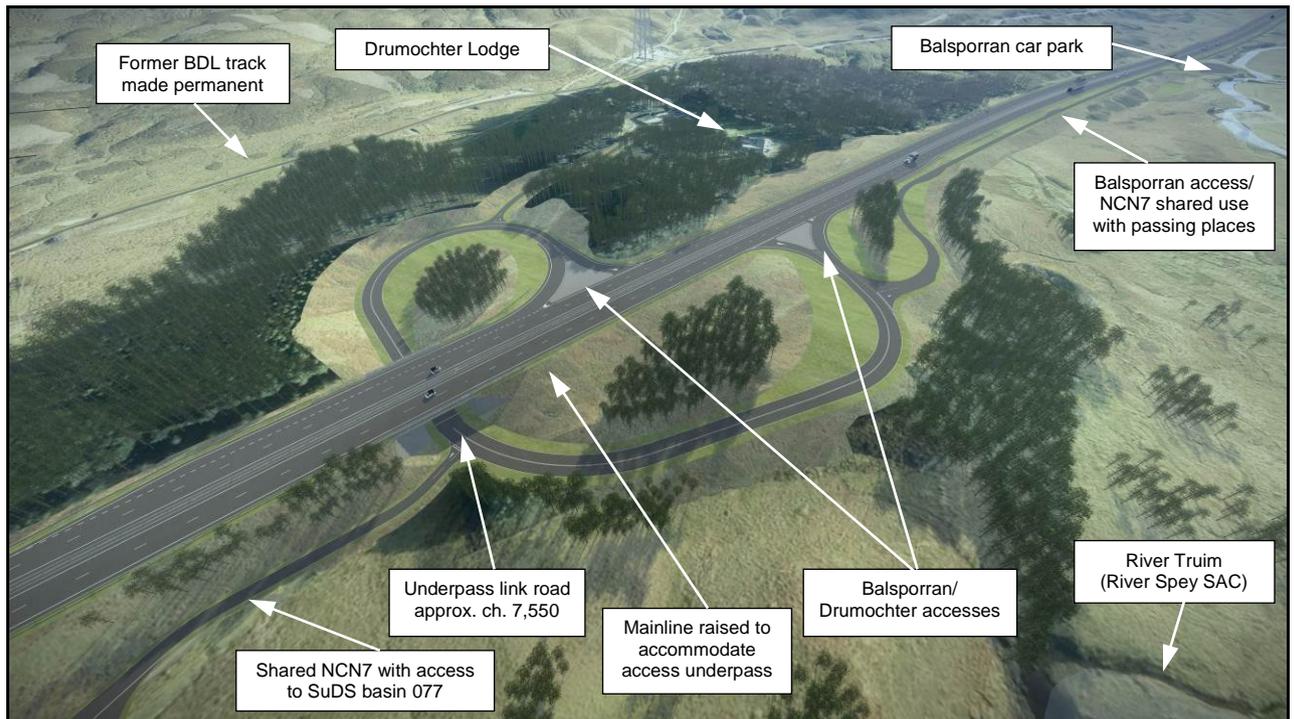


Figure 5-7: Balsporran Cottage/ Drumochter Lodge Access

- 5.3.16 The former BDL track will be made permanent, in order to provide estate access along the remaining length of the Proposed Scheme to the north, and into the separate Project 8, Dalwhinnie to Crubenmore, scheme further to the north. Drumochter Estates' land straddles both schemes, and existing, direct accesses from the A9 will be closed. Note that there are no current proposals to use the former BDL track as a haul route for A9 construction.

Mainline Alignment – Chainage 8,500 to 9,750

- 5.3.17 **Figure 5-8** presents two images showing the continuation of the Drumochter Estate (former BDL) access track northwards and into the Project 8 extent. The first image also notes that the location of the track crossing of the Allt Coire Chuirn will be retained on its present line (the Proposed Scheme currently includes for online replacement of this structure). The Allt Coire Chuirn is a highly mobile watercourse, and the current location is considered the most appropriate in terms of local morphological issues.
- 5.3.18 Both images show that dualling earthworks will reduce the width of the local shelter belt woodland on the southbound side, and that SuDS basins will be located on the northbound (downstream) side. Where required, the NCN7 will be realigned and locally widened, with passing places, for shared use access to SuDS locations.
- 5.3.19 The second image shows a new segregated lay-by on the northbound carriageway, which includes a link path to NCN7. Beyond the lay-by and SuDS basin 092, the Proposed Scheme is shown narrowing to provide a tie-in with the existing single carriageway. It should be noted that this is to accommodate a scenario where Project 7 is brought to construction in advance of Project 8 to the north. Should the alternative scenario occur, with Project 8 being brought to construction in advance of Project 7, there will be no need to narrow the Project 7 tie-in, rather the two dual carriageways would be brought together.

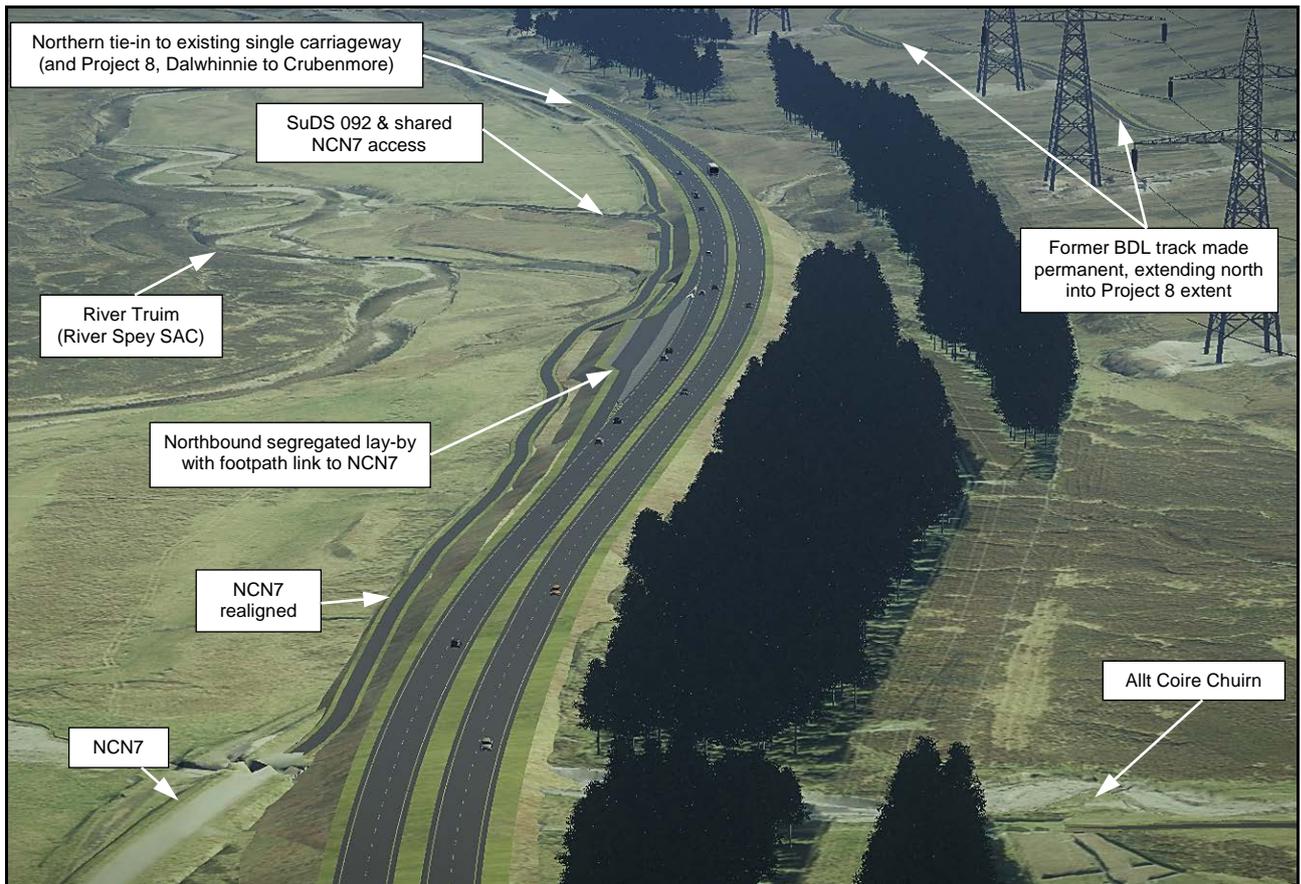
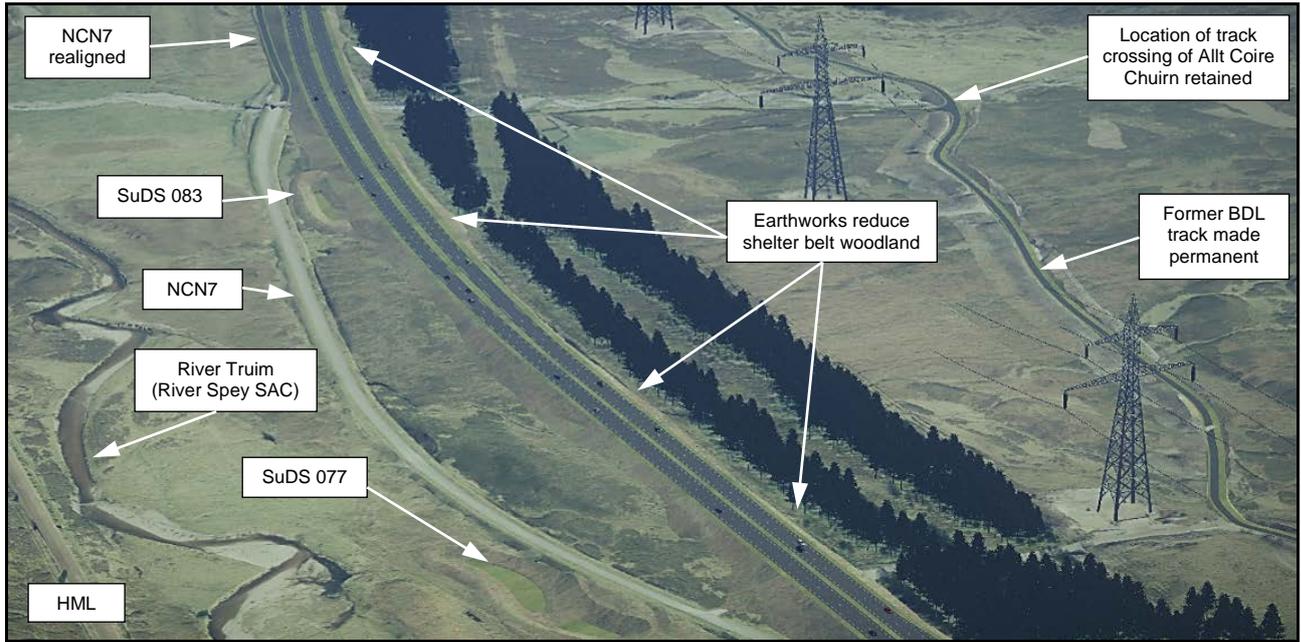


Figure 5-8: (2 images) Approx. ch. 8,500 to 9,750 – to northern tie-in to existing single carriageway and/or next A9 Dualling project (Project 8, Dalwhinnie to Crubenmore)

Proposed Scheme – Earthworks

- 5.3.20 The chainage locations of individual cuttings and embankments are shown on Engineering Plan and Profile **Drawings 5.9 to 5.15 (Volume 3)**. In general, proposed engineering slope angles range between gradients of 1:2 to 1:3 to ensure slope stability; however, a number of steeper or shallower slopes are required in some locations.
- 5.3.21 Steeper slopes include through Pass of Drumochter and some sections of retaining wall are required to limit encroachment into the Drumochter Hills nature conservation designation site boundary to the east (southbound) side. In other places, some slopes are ‘slackened out’ to deliver mitigation for landscape and visual impacts.
- 5.3.22 The Proposed Scheme is likely to include some rock cuttings, predominately situated on the eastern side through Pass of Drumochter.
- 5.3.23 Best practice design aims to deliver an earthworks balance to minimise material import to, and export from, the Proposed Scheme extent. A summary of bulk earthworks quantities is provided in **Table 5.2** below. In addition, **Chapter 10** provides an Outline Peat Management Plan, which address potential peat arisings, mitigation and management measures.

Table 5.2: Summary of Earthworks Quantities at DMRB Stage 3

Quantity/ details	DMRB Stage 3 (7 th Iteration)			
	Mainline	Dalnaspidal Junction	Balsporran - Drumochter Access/ Access Tracks/ Underpasses/ SUDS	Total
1. Cut (Acceptable)	213,159m ³	102,872m ³	23,868 m ³	339,899 m ³
2. Cut (Unacceptable)	71,053m ³	34,291m ³	7,954m ³	113,298m ³
3. Cut (Rock – excluding bulking factor)	0m ³	0m ³	0m ³	0m ³
4. Engineered Fill (Based on 1in2 slope)	427,259m ³	64,940m ³	82,897m ³	575,096m ³
5. Landscape Fill (Based on varied slope)	59,037m ³	N/A	N/A	59,037m ³
Approx. Surplus/ Deficit Volume (Engineered Fill) (1)+(3*1.15) – (4) -ve Deficit/ +ve Surplus	214,100m ³ Deficit	37,932m ³ Surplus	59,029m ³ Deficit	235,197m ³ Deficit
Approx. Surplus/ Deficit Volume (Landscape Fill) (2) - (5) -ve Deficit/ +ve Surplus	12,016m ³ Surplus	34,291m ³ Surplus	7,954m ³ Surplus	54,261m ³ Surplus
Notes:				
1. Cut and engineering fill volumes include adjustments for peat excavation.				
2. Engineering fill surplus/deficit calculation assumes rock bulking factor of 15% is applied to the rock cut volumes.				
3. Assumes peaty soil/topsoil re-used as topsoil. Also, no allowance has been made for re-using shallow and deep peat as landscape fill.				

Structures

- 5.3.24 The Proposed Scheme includes for changes to five existing structures and the introduction of two new structures, as described below. Note that all mainline watercourse crossings (bridges) are designed to accommodate the 1:200 year flood level plus a 20% allowance for climate change, plus an appropriate freeboard allowance.
- 5.3.25 **Table 5.3** provides an overview of proposed changes to existing structures. **Table 5.4** provides an overview of proposed new structures.

Table 5.3: Changes required to existing mainline structures

Name of structure and chainage	Existing structure	Proposed structure
Allt Coire Mhic Sith Underbridge (ch. 400)	Single span reinforced concrete buried arch. Masonry arch on downstream side	Retains sections of the existing bridge and widens on the east side. New elements same form as existing, with precast concrete arch sections. Older masonry arch carrying local access road will be removed. Vertical clearance to accommodate required flood level plus freeboard. A temporary structure will be provided for Dalnacardoch Estate access during the construction phase of the Proposed Scheme
Allt A'Chaorainn Underbridge (ch. 3,020)	Single span reinforced concrete buried arch	The existing structure will be replaced with a new single span increased to clear skew span approximately 14.0m. Access will be provided for vehicles as the structure will be a minimum of 4.5m wide and will have a 4.25m high clearance.
Allt Dubhaig Underbridge (ch. 7,220)	Single span reinforced concrete deck slab	The existing structure will be replaced with a new single span. The clear skew span of the structure will be 10.0m between abutment faces, to allow construction to be clear of the watercourse and of the top of the river banks.
Allt Chuirn (ch. 8,400)	Single span portal comprising 24 no. precast beams.	Replace existing structure with a new single span. The clear skew span of the structure will be 15.5m between abutment faces to allow construction to be clear of the watercourse, 6.0m larger than existing.
Allt Coire Bhotie (ch. 9,300)	Twin piped culvert	The existing structure will be replaced with a single span integral portal using pre-stressed beams. A clear span of 8.0m will be provided between abutment faces to allow construction to be clear of the watercourse.

Table 5.4: Proposed new structures

Name of structure and chainage	Proposed structure
Dalnaspidal Junction Underbridge (ch. 500)	A single span, buried pre-stressed concrete bridge is proposed, with a minimum square span of 10.6m, accommodating a 6.6m carriageway (with verges) below. The vertical clearance for the Dalnaspidal Junction Underbridge is a minimum of 5.7m
Drumochter Underpass (ch. 7,570)	A single span is proposed, with an 8.5m clear span and a minimum 5.3m clearance

Watercourse Crossings

5.3.26 A wide range of watercourse crossings are required under the Proposed Scheme, including:

- 5 bridge crossings (structures, as discussed above) on major watercourses
- 43 mainline culverted watercourse crossings including:
 - 4 box culverts on 'major' watercourses
 - 7 box culverts on 'minor' watercourses
 - 32 piped culverts on 'minor' watercourses

5.3.27 Additional crossings and culverts are required for associated access tracks and land drains. In general, mainline structures and culverts are sized to pass the 1:200 year flow, with freeboard, unless flood modelling identified loss of upstream flood storage which increased downstream risk. In such cases, culverts are sized to maintain the upstream storage.

- 5.3.28 **Figure 5-9** shows that each watercourse has been assigned a reference number, with prefix ‘MW’ for a major watercourse (shown on Ordnance Survey (OS) 1:50k maps), and prefix ‘W’ for a minor watercourse (not visible on OS 1:50k maps). In addition, each watercourse crossing has been assigned a unique reference number (referred to as a Hydro ID) and **Figure 5-9** highlights colour coding used to distinguish between major and minor watercourse crossings.

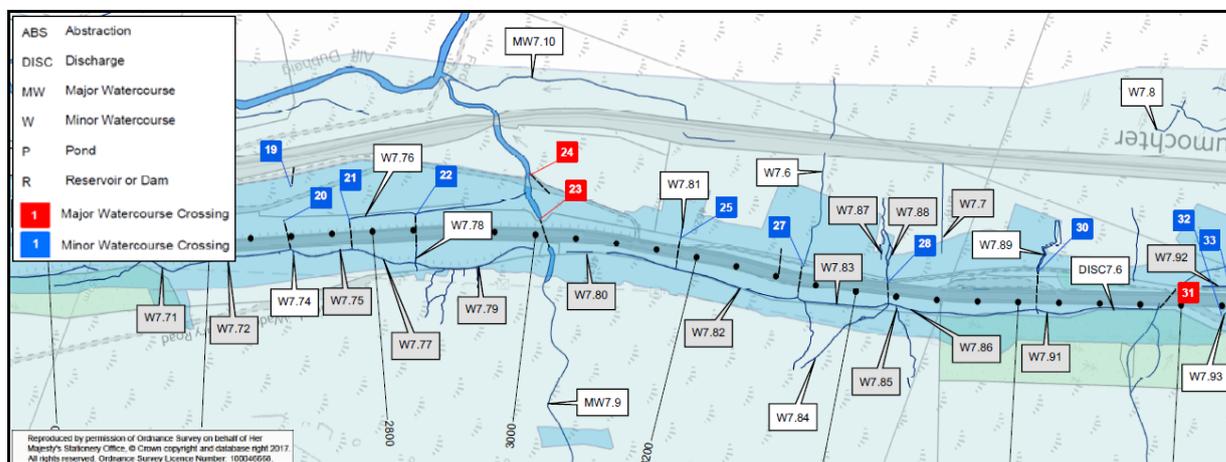


Figure 5-9: Major/minor watercourse and watercourse crossings reference system

- 5.3.29 During the design development process, ecological input identified a number of watercourse crossing locations where species permeability could potentially be improved with the incorporation of buried box culverts that incorporate natural bed material and mammal ledges. **Figure 5-10** shows typical cross-section details of such culverts, and the relevant Hydro IDs are noted below each image. Ledges are sized according to SNH advice, to sit above the 1:50 flood level where possible, be at least 450mm wide and include at least 450mm headroom.
- 5.3.30 Given the steep sidelong ground along much of the Proposed Scheme extent, a number of watercourses will be intercepted and diverted on the upstream side, in order to direct flows into new, or replaced culverts. Some of these watercourses will require steps, or cascades, to account for steep level changes. **Figure 5-11** shows a typical design detail for cascade features, where space available allows the introduction of pools to help reduce flow velocities and deliver additional ecological opportunity. It should be recognised however, that such extended cascade features may not be possible in all cases due to other constraints.

Drainage Network Design

- 5.3.31 The road surface drainage network for the Proposed Scheme has been developed in accordance with SuDS guidance and through consultation with SEPA, SNH and the relevant local authorities. This includes a minimum of two levels of SuDS treatment across the mainline and junction infrastructure, with enhanced provision included where discharge water quality assessments identified an additional need.
- 5.3.32 Typically, the drainage network includes for roadside filter drains as a first level, passing to a detention basin as the second level. Where required, enhanced provision typically includes a micro-pool at the outlet and/ or a further swale (open, grassed channel) to the discharge outfall.
- 5.3.33 SuDS basins have been sized to provide surface runoff attenuation in heavy rainfall events, in accordance with local authority requirements. SuDS basins are located at natural drainage (low) points on the network, to enable gravity flows; however, positioning has also been informed by

constraints analyses, including avoidance of 1:200 year floodplain encroachment, deeper peat deposits and sensitive habitats, where possible.

- 5.3.34 Similarly, points upstream of larger watercourse crossings, where it would be difficult to continue road drainage across a decked bridge structure, have been identified. Locations have also been identified at intermediate points on long road drainage catchments, to sub-divide the catchment area, ultimately aiming to keep associated SuDS feature areas to a reasonable size.
- 5.3.35 Due to the sensitive nature of local receiving waters (i.e. the Drumochter Hills SSSI is supported by numerous watercourses and the River Truim (River Spey SAC) at the northern extent of the Proposed Scheme), drainage discharge from each SuDS basin has been assessed to ensure it meets environmental quality standards. In some locations, outfalls direct to the Truim are required; however, in these cases low velocity outfalls have been incorporated to minimise risk of scour to SAC habitats.
- 5.3.36 In addition, each SuDS basin is sized assuming that it will be lined to prevent infiltration and to include shut off (e.g. a gate valve or similar) to provide spillage containment, further minimising risks to the SAC.
- 5.3.37 Access track drainage has been considered and, due to low levels of anticipated use, one level of drainage treatment is provided in line with SEPA and SNH guidance for design and drainage of upland tracks, and as agreed with SEPA via the A9 Dualling Environmental Steering Group (ESG). In addition, pre-earthworks drainage systems, to intercept hillside, cutting and embankment runoff are included. These are provided as cut off drains to intercept water that is not affected by road surface runoff, does not require treatment and can be directed to a local watercourse within the natural catchment.

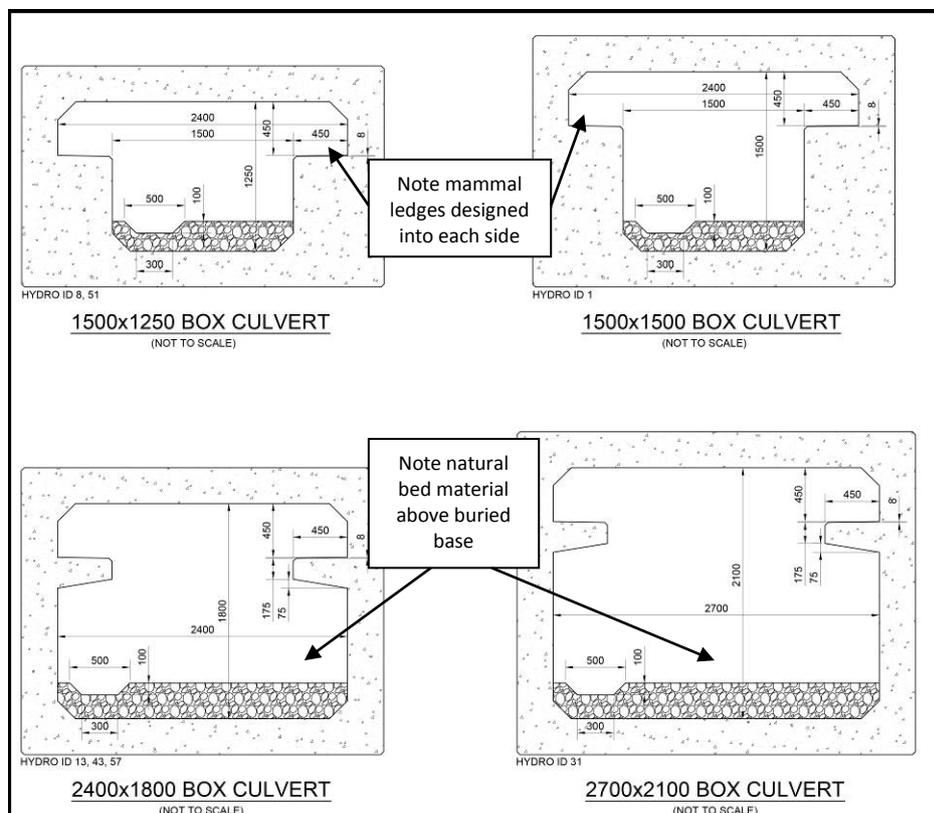


Figure 5-10: Typical cross-sections of buried box culverts with bed material and mammal ledges

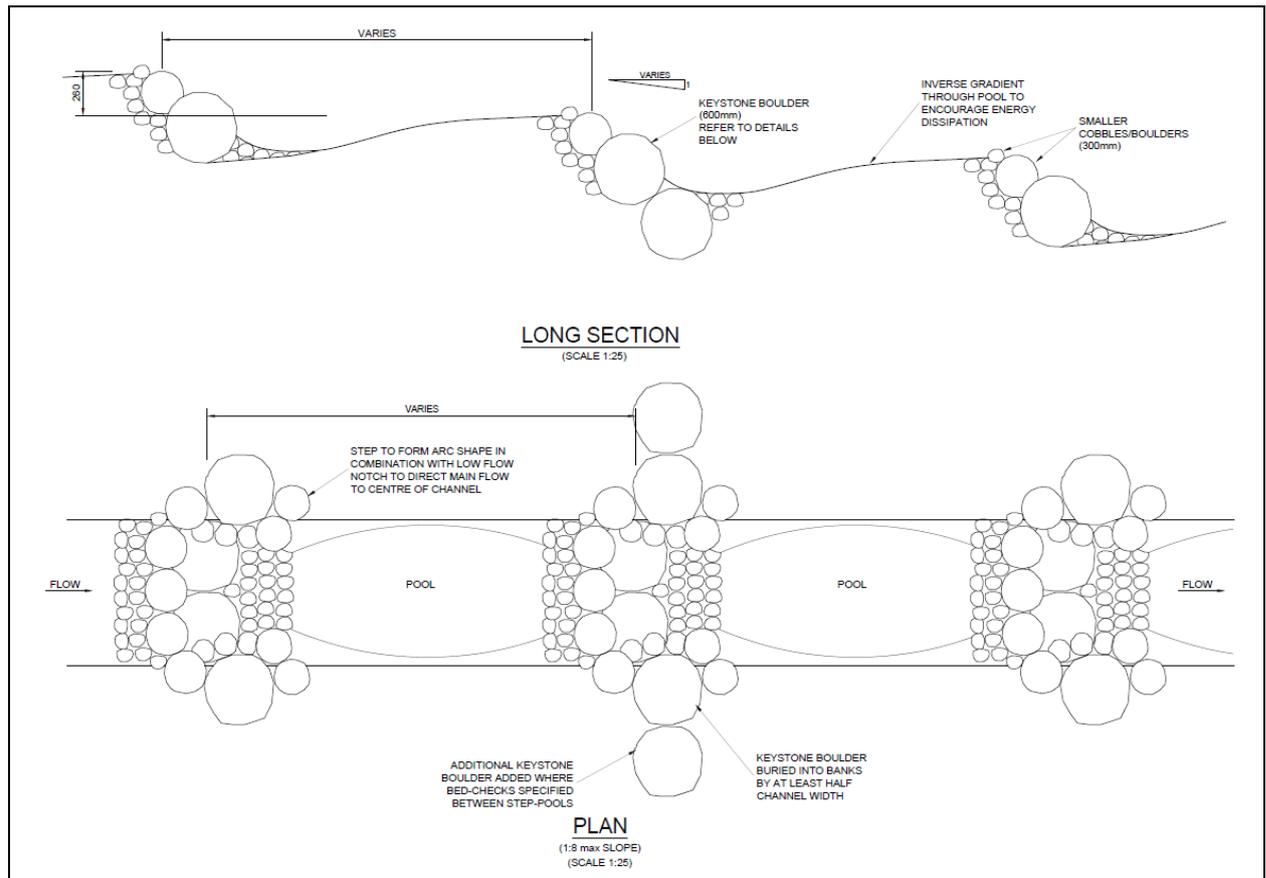


Figure 5-11: Schematic overview of typical cascade with pools detail

Compensatory Floodplain Storage

- 5.3.38 The Proposed Scheme has been tested against the 1:200 year flood model to identify floodplain encroachments and to reduce these through design refinement where possible. However, given the close proximity of various watercourses and numerous watercourse crossings, full floodplain avoidance is not possible. Compensatory flood storage is therefore required to offset floodplain displacement due to encroachments.
- 5.3.39 The Proposed Scheme includes a number of areas, which will include some limited excavation to lower the ground to provide level-for-level storage. These areas are therefore defined as permanent works, to provide compensatory flood plain storage.

Road Surface

- 5.3.40 The Proposed Scheme design assumes that a low noise road surface will be laid in accordance with relevant specifications.

Lay-bys

- 5.3.41 The Proposed Scheme replaces all existing roadside bay-type lay-bys and introduces three southbound and four northbound lay-bys. One southbound and three northbound lay-bys will be extended 'Type A' lay-bys, which include a separation island and merge tapers to/ from the mainline carriageway, with potential for connection to NMU routes; the remainder are emergency lay-bys, which are the basic roadside bays.

- 5.3.42 There are safety standards guiding lay-by placement that restrict how close lay-bys can be from significant bends, junctions, in order to maintain good visibility; however, where possible within these safety standards, lay-bys have been located in areas that also provide good views out to the surrounding landscapes.

Non-Motorised Users (NMU) Provision

- 5.3.43 Cycle route NCN7 runs alongside the existing A9 throughout the Proposed Scheme extents. Where the dualling results in land-take affecting this route, local realignments will maintain NCN7 connectivity. In addition, due to SuDS feature maintenance requirements, NCN7 will be locally widened to provide passing places for shared use. All related NCN7 works will be completed to provide an equal or better standard of provision.
- 5.3.44 NMU links to local tracks have been maintained, as noted under ‘Access to Land and Properties’ below. In terms of structures that may/ may not provide opportunities for NMU passage under the A9, **Table 5-5** summarises the clearances provided by structures in the Proposed Scheme.

Table 5-5: Clearance provided in Proposed Scheme structures

Chainage	Structure	Clearance (m)
400	Allt Coire Mhic-sith Underbridge	>2
500	Dalnaspidal Junction Underbridge	>5
3,020	Allt A'Chaorainn Underbridge	~4
7,220	Allt Coire Dubhaig Underbridge	~1
7,570	Drumochter Lodge/ Balsporran Underpass	>5
8,400	Allt Coire Chuirn Underbridge	~1
9,300	Allt Coire Bhotie Underbridge	~1
Note it is considered that structures with less than 2m clearance may be less likely to be used by NMUs, and those with approx. 1m clearance are not considered suitable for NMU access		

Access to Land and Properties

- 5.3.45 Proposed accesses to private land are provided as described in **Table 5-6** below.

Table 5-6: Proposed accesses

Location/ chainage	Proposed access
Dalnaspidal access, ch. 200 to 450	Side road providing access to Dalnaspidal as part of new junction, which ties in to private accesses to properties on the eastern and western sides of the Highland Main Line (HML) railway.
Dalnacardoch access track, ch. 450	Local realignment of existing NMU route which provides access to Dalnacardoch Estate and the existing telecoms mast.
Dalnaspidal footpath link, ch. 900 south to ch. 600.	Footpath link from the new proposed lay-by at ch. 1,000, providing access to Dalnaspidal and the old A9 (NMU routes), from which views of the valley can be obtained.
Access at Allt A'Chaorainn Underbridge, ch. 3,020	New shared access path linking to NCN7 on the western side of the A9, and providing a field access to Dalnacardoch Estate on the eastern side of the mainline.
Balsporran access, ch. 7,400 south to ch. 6,800	Access to Balsporran Cottages. The access to the Cottages will link off the northbound loop of the Balsporran/ Drumochter Junction, running south back to the Cottages.
Drumochter Lodge access, ch. 7,400 to ch. 7,800	Access to Drumochter Lodge. The access to Drumochter Lodge will link off the southbound loop of the Balsporran/ Drumochter Junction.

Location/ chainage	Proposed access
Drumochter estate access track, ch. 7,700 to northern end of Proposed Scheme	The former BDL track will be made permanent to provide for Drumochter Estate access, due to the closure of existing direct estate accesses from the A9. The Proposed Scheme includes for making the BDL track permanent from the Allt Coire Chuirn to the connection with the existing quarry track access.
Access to SuDS features Various locations	SuDS features within the Proposed Scheme will be served by new access tracks, some of which are combined with those described above. NCN7 will be realigned and widened locally in places, to provide passing places for occasional maintenance access to SuDS features.

Lighting and Signage

- 5.3.46 The Proposed Scheme does not include lighting for the mainline carriageway or the Dalnaspidal Junction, which accords with the Cairngorms National Park ‘dark skies’ Special Landscape Quality (SLQ). However, where necessary, road traffic signs and underpasses may be lit in accordance with applicable safety standards, potentially including the underpasses at Dalnaspidal junction, Drumochter/ Balsporran access and the Allt a’ Chaorainn pedestrian/ landowner underpass.
- 5.3.47 Signage has been developed in accordance with Transport Scotland’s guidance on *Road Furniture in the Countryside, 2006*. Signs are required to have high visibility for road users; however, the siting of signage has been considered to minimise skylining and visual clutter.

Fencing

- 5.3.48 Permanent post and wire fencing may be erected along the Proposed Scheme boundaries, depending on landowner requirements. Ecological fencing (e.g. otter fencing) will be introduced, where necessary, to guide small mammals to safe crossings under the road. There is no intent to introduce deer fencing along the full length of the Proposed Scheme. Existing deer fencing will be replaced where affected, and some additional deer fencing will be introduced in certain locations to route larger mammals to suitable safe crossings under the road.

5.4 Temporary Works (Construction Phase)

- 5.4.1 Construction activities required to build the Proposed Scheme are considered to be temporary works, and will typically include:
- Site clearance, including vegetation clearance
 - Stock proof fencing
 - Pre-earthworks drainage and temporary SuDS
 - Earthworks general (cut/ fill)
 - Material transfer via haul routes and temporary watercourse crossings
 - Rock cuts and rock breaking
 - Stockpiling and temporary lay-down
 - Watercourse diversions and culverts
 - Drainage networks, including SuDS basin and outfall installation
 - Earthworks rolling and compaction
 - Road sub-layer formation
 - Central reserve works
 - Road pavement laying
 - Structures demolition
 - Bridge abutment construction
 - Bridge structure and deck construction
 - Road marking
 - Signage installation
 - Site restoration (ecological and landscape mitigation works)
 - Active traffic management

- 5.4.2 It is therefore necessary to ensure that sufficient land is made available to enable construction activities around the perimeter of the permanent infrastructure works extents, whilst at the same time limiting the amount of additional land likely to be affected.
- 5.4.3 Temporary works areas have been identified as being necessary to enable construction; however, it is considered that such areas will not be permanently lost to the Proposed Scheme, and would be suitable for restoration to conditions that enable recovery post-completion or, where shown on **Environmental Mitigation Drawings 6.1 – 6.12 (Volume 3)**, to provide areas for mitigation to address the impacts of the Proposed Scheme. The total surface area provided for temporary works is approx. 36.3 hectares over the 10km length.
- 5.4.4 It should be noted that although the approach adopted identifies ‘permanent’ works areas, ‘temporary’ works areas and additional land areas for mitigation, for the purposes of clarity, all land identified as ‘*necessary for the safe construction and operation of the scheme*’ would be considered for permanent land take and purchase under the Roads (Scotland) Act 1984.
- 5.4.5 Whilst consideration of typical construction works activities has informed a temporary works boundary for assessment, in order to enable the Principal Contractor flexibility of use at construction stage, no specific temporary land uses are defined. Construction activities are discussed briefly below, with further information provided in **Appendix 5.1 (Volume 2)**.

Indicative Construction Programme

- 5.4.6 The EIA of the Proposed Scheme has been undertaken based on an anticipated construction programme of approximately 2.5 years (circa 30 months). It is considered that the following approximate timescales (which may overlap during the overall construction phase) will apply:
- Formation of earthworks – 6 months
 - Bridge works – 1.5 years
 - Pavement works – 2 years
- 5.4.7 A detailed construction programme will be developed by the Principal Contractor; however, further information on possible construction sequencing is provided in **Appendix 5.1 (Volume 2)**.

Access to Property and Non-Motorised User Routes

- 5.4.8 During construction, suitable access to property and NMU routes shall be maintained by the Contractor; however, during certain construction operations, temporary closures or diversions may be required.

Works Compounds

- 1.1.2 At DMRB Stage 3 it is not possible to determine where a Contractor would prefer to locate works compounds (i.e. site accommodation, offices, welfare facilities, and parking for staff and storage areas for materials and plant); this is generally left to the Contractor to agree with local landowners and secure any relevant permissions/ consents from environmental regulators and planning authorities. Works compounds are not therefore considered within the Proposed Scheme under assessment.

Borrow Pits

- 5.4.9 At DMRB Stage 3 it is not possible to determine where a Contractor would seek to gain any additional material from borrow pits, potentially in proximity to the Proposed Scheme extents. This is left to the Contractor to agree with local landowners and secure any relevant permissions/

consents from environmental regulators and planning authorities. Borrow pits are not therefore considered within the Proposed Scheme under assessment.

Structures and Culverts

- 5.4.10 Structures and culverts will generally be constructed in two halves, to enable A9 traffic to continue running over existing structures until the first half of the new structure is complete, and traffic can be transferred. The second half will then be completed in conjunction with any required removal of the existing, redundant structure.
- 5.4.11 It should be noted that the Contractor will need to assess the load capacity of structures for construction use and temporary alternatives, or suitable replacement, structures may be required. As this EIA does not specify haul routes or other construction elements, an assessment of such structures has not been undertaken at this stage.

Watercourse Diversions

- 5.4.12 The Proposed Scheme will result in a number of watercourse diversions. These will take place in stages depending on the road construction arrangement and in some cases, a temporary watercourse diversion will be required to enable completion of permanent diversion works. Land required for diversion works has been considered within the assessment boundaries.

Temporary SuDS and Access Tracks

- 5.4.13 A principal concern raised by SEPA through the ESG was ensuring the provision of sufficient land for construction stage sediment controls, i.e. temporary SuDS such as settlement lagoons. Land required for such features has been considered within the assessment boundaries, typically in proximity to watercourses on the downstream side of the A9.
- 5.4.14 Various temporary access tracks may be required throughout the construction stage, for example, to enable access to install permanent drainage networks and outfalls, as well as to temporary construction SuDS and other areas. Land required for such temporary access has been considered within the assessment boundaries.

Temporary Works Fencing

- 5.4.15 Temporary stock proof fencing will be erected, prior to construction works, where considered appropriate by the Contractor. Typically, the aim is to delineate the works site and minimise risk of larger mammals (e.g. deer, sheep, horses or cattle) and people wandering into an active works area. Temporary works fencing does not present a significant barrier for smaller mammals.

Piling

- 5.4.16 There are no proposals to use piling for structural foundations within the Proposed Scheme. However, it is possible that piling may be considered in areas of deep peat, in favour of full excavation to rockhead. It is also possible that sheet piling techniques may be used during construction to enable formation of concrete, or to create temporary barriers at watercourses or in waterlogged areas.
- 5.4.17 **Chapter 10 (Geology, Soils and Groundwater)** and the Outline Peat Management Plan recommends consideration of piled solutions to reduce peat excavation volumes in particular locations. Recommendations are included within **Chapter 10** for the Contractor to adhere to appropriate guidance should piling techniques be used.

Traffic Management Phasing

- 5.4.18 The Proposed Scheme requires dualling to both the east (southbound) side and west (northbound) side. Buildability has informed considerations on landtake requirements; principally with a view to keeping A9 traffic flowing on the existing carriageway during the primary phases of construction.
- 5.4.19 Generally, new underbridges will be prioritised in each phase, such that they can then be used in haul routes for construction traffic. The majority of construction works will require a reduction in lane width to maintain 2-way traffic, while the new carriageway is constructed adjacent.
- 5.4.20 There will be some sections of temporary carriageway required to facilitate construction of crossovers and tie-ins, and where level differences between the existing and proposed mainline present construction complexities. Where an elevated carriageway is required, reinforced slopes or soil nailing will be used to enable construction. Appropriate temporary barriers will be installed prior to construction, where required.
- 5.4.21 The exception to the above will be at tie-ins when single-lane working is required, although it is anticipated that such works may be undertaken overnight to minimise disruption to traffic flows. Construction of tie-ins will be carried out during off peak times, most likely with temporary traffic light arrangements. Other temporary traffic management measures may be required in various locations, including:
- Temporary works access/ egress points throughout the site
 - Temporary deceleration lanes
 - Potential need for temporary roundabouts, or plant crossing points to facilitate movement of plant for earthwork haulage operations
 - Access to general fill and landscape fill stockpiles
 - Temporary traffic management diversion areas (around structures and tie-ins)

Construction Stage Lighting

- 5.4.22 Temporary lighting may be required across the Proposed Scheme where night time working is necessary, to minimise traffic disruption/ diversions/ lane closures, and also along temporary access roads or other locations where temporary traffic management measures require lighting for safety reasons. Temporary lighting may also be required for security and safety reasons at Contractor compounds during morning and evening working hours in winter.
- 5.4.23 The Contractor will develop a construction lighting plan and method statement, to ensure that lighting in sensitive ecological areas is managed appropriately, in consultation with SNH.

Waste Management

- 5.4.24 Proposed Scheme construction is likely to produce a range of waste types and it is envisaged that the majority of arisings will be re-used on-site, or at an appropriately licensed or registered exempt site elsewhere, or segregated and sent for recycling or recovery at a materials recovery facility. **Chapter 18, Materials** provides more details.

5.5 References

- 5.5.1 Relevant references for introductory Chapters 1 to 7 of this ES are compiled and listed at the end of Chapter 7.