

5. The Proposed Scheme

5.1. Introduction

- 5.1.1. This chapter describes the key components and construction activities associated with the Proposed Scheme. These comprise the mainline alignment, junctions, public and private roads, structures, drainage, landscape proposals, land take, environmental mitigation measures and anticipated methods and programme of construction.
- 5.1.2. The information provided is based on the design of the Proposed Scheme at DMRB Stage 3.
- 5.1.3. The Proposed Scheme is expected to be procured by means of a Design & Build (D&B) type contract. Under the terms of this contract, the 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 project including any maintenance period would remain with the Scottish Government. Responsibility for operating and maintaining side roads would remain with The Highland Council on completion of the Proposed Scheme.
- 5.1.4. Under a D&B type contract, a specimen (outline) design is prepared for the proposed scheme, which the appointed contractor(s) can optimise as the detailed design is developed. Such optimisation must be within the constraints imposed by the ES.
- 5.1.5. Optimisation of the Proposed Scheme design will still be deemed to comply with this ES provided that any design changes have been subject to environmental review to ensure that the residual impacts would not be greater than those reported in this ES, and subject to Transport Scotland's acceptance of the findings of any such review.

5.2. Existing Conditions

Existing Road Network

- 5.2.1. The existing road network, including key environmental designations and constraints, is shown on Figure 5.1.
- 5.2.2. The existing trunk road is generally a single carriageway 7.3m wide with 0.7m hardstrips throughout this section of the scheme with the exception of a short section of Wide Single (2+1) (WS2+1) carriageway that provides northbound overtaking opportunities for approximately 1km in the vicinity of Carrbridge.

Existing Junctions and Accesses

- 5.2.3. There are a number of junctions located within this section of the A9 allowing links to adjacent trunk roads and local roads, as well as linking into the adjacent residential and tourist centre of Aviemore and outlying villages.
- 5.2.4. Within the project extents, there is one junction which provides a direct trunk road to trunk road connection. The junction is located at Granish to the north of Aviemore and links the A9 and A95 trunk roads.
- 5.2.5. The A95 (A9 to Charlestown of Aberlour) is a single carriageway road which runs from Granish through Grantown-on-Spey and continues on to Charlestown-of-Aberlour. The A95 forms a key route for business in the area, particularly with respect to whisky

production where much of it is transported to the Central Belt via the A95 and then onto the A9. East of Granish, the B9152 branches off from the A95 and runs due south to Aviemore town centre. This junction also provides access to Carrbridge from the South. There are 4No. existing local authority roads that have direct access onto the A9 as follows:

- The B9152 (Aviemore to Kincaig) runs from Kincaig northwards to Aviemore to the east of the existing A9 alignment. A link road connects the A9 to the B9152 opposite Lynwilg Farm. The B9152 was generally the original A9 before the current alignment was constructed in the late 1970s and early 1980s. The B9152 is a single carriageway road, approximately 7m wide with reasonable alignment in the vicinity of the scheme. The B9152 also connects to the A9 north of Aviemore at Granish at the junction with the A95 noted above.
- The U3050 Lynwilg Road forms a junction with the A9 northbound lane opposite and approximately 100m north of the B9152 junction noted above. This road provides access to Lynwilg Farm, Kinrara Estate/Distillery and continues as a private road to the Allt na Criche Outdoor Centre.
- The A938 (Black Mount to Dulnain Bridge) runs from the A9 junction at Black Mount to Dulnain Bridge, where it joins the A95. This road provides access to Carrbridge and further east to Dulnain Bridge and onwards to Grantown-on-Spey.
- The U2400 unclassified road from Black Mount connects with the A9 immediately south of Slochd Summit and continues south crossing the A9 and connecting to the A938 close to its junction with the A9.

5.2.6. There are a total of 32No. existing private and agricultural accesses that directly access the A9 within the project extents. These consist of 18No. from the northbound carriageway and 14No. from the southbound carriageway.

Existing Structures

5.2.7. Along this section of the A9 there are 13No. bridges, 29No. culverts, 3 No. livestock creeps and 2 No. sign gantries recorded. Bridges include the following:

- *Allt Chriochaidh Underbridge* - Located approximately 5km south west of Aviemore, the bridge carries the A9 over a watercourse (ch. 960). It was constructed circa 1982 and is a single span of reinforced concrete box construction.
- *Ballinluig Underpass* - Located approximately 4km south west of Aviemore, the bridge carries the A9 over a local road (ch.2320). It was constructed circa 1982 and is a single span of corrugated metal pipe construction.
- *Lynwilg Underpass* - Located approximately 3km south west of Aviemore, the bridge carries the A9 over a local road (ch. 3110). It was constructed circa 1982 and is a single span of corrugated metal pipe construction.
- *Allt na Criche Underbridge* - Located approximately 2.5km south west of Aviemore, the bridge carries the A9 over a watercourse (ch. 3910). It was constructed circa 1980 and is a single span of reinforced concrete box construction.
- *Craig Dhu Underpass* - Located approximately 1.5km south west of Aviemore, the bridge carries the A9 over a local road (ch. 5120). It was constructed circa 1980 and is a single span of corrugated metal pipe construction.
- *Craigellachie National Nature Reserve Underpass* - Located immediately west of Aviemore, the bridge carries the A9 over a walking path leading to Loch Puladdern (ch. 5680). It was constructed circa 1980 and is a single span of buried corrugated metal pipe construction.

- *Milton Caravan Site Underbridge* - Located immediately west of Aviemore, the bridge carries the A9 over a walking path leading to Loch Puladdern (ch. 7650). It was constructed circa 1980 and is a single span of corrugated metal pipe construction.
- *High Burnside Underpass* - Located immediately west of Aviemore, the bridge carries the A9 over a public road leading to a new housing development (ch. 7760). It was constructed circa 2006 and is a single span of integral reinforced concrete construction.
- *Granish Underpass* - Located approximately 1km north of Aviemore, the bridge carries the A9 over a small farm track (ch. 8720). It was constructed circa 1980 and is a single span of corrugated metal pipe construction.
- *Station Road Underpass* - Located approximately 8.7km north of Aviemore, the bridge carries the A9 over an unclassified local road "Station Road" (ch. 16920). It was constructed circa 1979 and is a single span integral reinforced concrete structure.
- *Dalnain Underbridge* - Located approximately 8.7km north of Aviemore, the bridge carries the A9 over the River Dalnain (ch. 16950). It was constructed circa 1979 and is a three span structure, with the superstructure comprising continuous weathering steel plate girders composite with a reinforced concrete slab deck.
- *Baddengorm Underbridge* - Located approximately 9.6km north of Aviemore, the bridge carries the A9 over a watercourse (ch. 17800). It was constructed circa 1979 and is a single span bridge with a reinforced concrete slab deck.
- *Slochd Beag Bridge* - Located approximately 13.9km north of Aviemore, the bridge carries the A9 over a valley, the Perth to Inverness railway line and a local road (the old A9, U2400) (ch. 22100). It was constructed in 1979 and is a three span structure with the superstructure comprising continuous weathering steel plate girders composite with a reinforced concrete slab deck.

Existing Lay-bys and Bus Stops

- 5.2.8. There are 19No. lay-bys located within the project extents, consisting of 1No. Type A layby and 18No. Type B lay-bys.
- 5.2.9. There are no bus stops within this section; buses set down and pick up passengers within the settlements themselves, which the existing A9 alignment bypasses.

Non-Motorised Users

- 5.2.10. The Cairngorms National Park Core Paths Plan identifies Core Paths adjacent to the A9 corridor in the vicinity of Aviemore. To the west, are the Core Paths within Craigellachie Nature Reserve, and to the east is the Aviemore Orbital Path. There are nine Core Paths within the study area, eight designated by the Cairngorms National Park Authority, and one by The Highland Council along with nineteen other local or informal paths either on or off the road network. There are also six Rights of Way including 3 crossing points on the A9.
- 5.2.11. National Cycle Route 7 is also designated as a Core Path, which splits in Carrbridge. The western (off-road) branch follows the route of General Wade's Military road and passes beneath the A9 at Carrbridge Underpass, "Station Road". The eastern (on-road) branch follows the A938 to Black Mount junction and utilises the Slochd settlement access road crossing under the A9 at Slochd Beag Bridge. The two branches re-join to the west of the A9 and then run parallel to the A9 towards and through Slochd Summit.

Traffic Data

- 5.2.12. The traffic volume for this section of the A9 has been obtained from the 2012 Automatic Traffic Count (ATC) data and 2015 junction turning counts provided by Transport Scotland. The two-way traffic volume, obtained was 7,600 AADT.
- 5.2.13. Traffic flows are noted to vary along the length of the route. Typically flows are slightly higher to the northern and southern ends of the project and lower in the middle. This is considered to be attributable to the limited access to the north and south, whereby traffic approaching from the south disperses at Aviemore South junction and traffic approaching from the north disperses at Black Mount junction. However, overall this variation is not considered significant given that all flows are well within the capacity of the proposed scheme.
- 5.2.14. It is also noted that there is considerable seasonal variation experienced, with peak summer flows in the order of 30% higher on summer weekdays compared to winter weekdays and summer weekend flows can be double those occurring in winter. The proportion of traffic turning on and off the A9 also varies seasonally with much greater turning flows recorded in the summer. There is much less variation by day of the week with flows being relatively constant across the week.
- 5.2.15. Traffic flows from the Transport Model for Scotland (TMfS) have been provided by Transport Scotland. TMfS traffic flows have been provided for a base year of 2015 and forecast years of 2026, presumed first full year of operation, and 2041, the design year. Both forecast year traffic flows have been provided in two forms, firstly traffic growth if the A9 was not to be improved and secondly with the A9 fully dualled.

5.3. Description of the Proposed Scheme

- 5.3.1. Principal components of the proposed scheme are described below. The general layout is shown in Figures 5.2 (Proposed Scheme Layout) and 5.3 (Plan and Profile). Junction layout plans are shown in figures 5.4 to 5.6. Indicative designs for key structures are shown in Figures 5.7 (Dulnain Bridge) and 5.8 (Slochd Beag Bridge). Landscape proposals and environmental mitigation are shown in Figure 13.4.

Proposed Mainline Alignment

- 5.3.2. The A9 Dualling: Dalraddy to Slochd involves the widening of the existing A9 to dual carriageway standard over five distinct sections:
- From Allt an Fhearna watercourse near Dalraddy to Lynwilg (ch.350 to approximately ch. 2500), comprising predominantly northbound widening for approximately 2.1km in a north-easterly direction.
 - From Lynwilg to Aviemore (ch. 2500 to approximately ch. 5200), comprising hybrid widening to both sides of the existing A9 for approximately 2.7km in a north-easterly then northerly direction.
 - From Loch Puladdern to south of Avielochan (ch. 5200 to approximately ch. 9800), comprising predominantly southbound widening for approximately 4.6km in a generally northerly direction.
 - From south of Avielochan to just north of Avielochan (ch. 9800 to approximately ch. 10550), comprising predominantly northbound widening for approximately 0.75km in a generally northerly direction.
 - From just north of Avielochan to just north of Slochd summit (ch. 10550 to approximately ch. 24000) comprising predominantly southbound widening for

approximately 13.45km in a generally northerly, then becoming north-westerly direction.

- From north of the Slochd Summit to the tie into the existing dual section (ch 24000 to approximately 25000) comprising of hybrid to mostly northbound widening for approximately 1km.

Proposed Junctions

- 5.3.3. The existing A and B classified road junctions are to be replaced with 3 No Compact Grade Separated junctions as part of the project. The location of these are as follows;
- Aviemore South Grade Separated Junction (B9152) (ch. 2800)
 - Granish Grade Separated Junction (A95T/B9152) (ch. 8700)
 - Black Mount Grade Separated Junction (A938) (ch. 18900).
- 5.3.4. The Stage 3 design seeks to rationalise direct access from public roads and private accesses diverting to the proposed grade separated junction or to the local road network where possible. Based on this rationalisation 4 No. Left In, Left Out (LILO) accesses are proposed to facilitate direct access to the A9 as follows:
- Private Access to northbound carriageway of A9 (ch. 5650, at Craigellachie NNR)
 - Private Access to northbound carriageway of A9 (ch. 13870 in the vicinity of Lethendry)
 - Private Access to southbound carriageway of A9 (ch. 14300 in the vicinity of Docharn)
 - U2400 Public Road to northbound carriageway of A9 (ch. 22750 at Slochd)
- 5.3.5. All other existing direct accesses are to be closed.

Local Roads and Private Accesses

- 5.3.6. The 3 No. grade separated junctions defined above require localised diversions of the connecting local road network as follows.
- Aviemore South GSJ requires approximately 550m of widening / realignment of the existing B9152 to form a ghost island junction with the compact connector road.
 - Granish GSJ requires approximately 300m of localised realignment of the B9152 and 250m widening/realignment of the A95 on the approach to the proposed roundabout.
 - Black Mount GSJ requires approximately 750m realignment of the U2400 and A938 to form the connection to the GSJ.
- 5.3.7. Two additional local roads also require diversion as follows.
- U3050 extended / realigned for approximately 550m to close the direct access to the A9 and divert to Aviemore South GSJ
 - U2400 realigned for approximately 300m to the LILO access to the A9 at Slochd Junction.
- 5.3.8. The proposed dualling also requires approximately 9km of new or upgraded private access tracks, 3 No Left In, Left Out junctions (in addition to the U2400 LILO access at Slochd described above) and an additional 8 underpasses to provide alternative access to the 32 direct accesses to the A9.

- 5.3.9. A further 6.2km of new private access tracks are required to facilitate maintenance access for the Sustainable Drainage Systems (SuDS) required by the project.

Proposed Structures

- 5.3.10. The following new structures (excludes culverts), listed in Table 5.1 below, are included in the scheme design.

Table 5.1: Proposed Structures

Structure Name	Chainage	Easting	Northing
Allt na Fhearna (Access track)	Offline	285563	809248
Allt Chriochaidh (A9 and access track)	570	285658	809540
Loch Alvie Creep M/U	1500	286475	810022
Ballinluig Pedestrian U/P	1925	286857	910198
Lynwilg U/P	2680	287591	810321
Aviemore South Junction	2720	287719	810348
Aviemore South Connector Road U/P	Offline	287749	810144
Criche Bridge	3540	288363	810614
Craig Dhu U/P	4733	289137	811458
Craigellachie NNR U/P	5290	289140	812012
Milton Sheep Creep	7000	289270	813701
Milton Caravan Site U/P	7250	289349	813941
High Burnside U/P*	7370	289391	814057
High Burnside U/P New	7370	289402	814051
Granish U/P	8100	289660	814726
Granish Junction U/P	18750	289947	815309
New Underbridge Ch. 11200 (replacing Laggantygowan)	11200	290864	817527
New Underpass Ch. 12360	12360	291043	818649
New Underbridge Ch. 14400	14400	290772	820663
Station Road Underpass*	16550	289708	822507
Station Road Underpass New	16550	289708	822507
Dulnain*	16610	289668	822547
Dulnain New	16610	289708	822507
Allt nan Ceatharnach	Offline	289120	822681
New Underbridge Ch. 17020	17020	289378	822834
Baddengorm	17450	289125	823160
Black Mount Jct U/P	18810	288048	824007
New Underpass Ch. 20710	20710	286233	823849
Slochd Beag Bridge*	21760	285278	823874
Slochd Beag Bridge New	21760	285321	823887

New Underpass Ch. 23550 (Soldier's Head Underpass)	23550	284088	824937
New Underpass Ch. 24300	24320	283471	825653
*denotes existing structures which are to be retained in the new design			

Culverts

- 5.3.11. All watercourses crossing the proposed mainline will require a culvert and these have been sized to accommodate the required flood design flows of 1 in 200 year plus climate change plus an appropriate freeboard allowance.
- 5.3.12. All of the existing corrugated steel pipe culverts will be replaced. The new culverts will consist of reinforced concrete box or portal construction thus minimising construction and maintenance operations. Portal frame culverts are proposed on the Caochan Ruadh, Ballinluig Burn, Aviemore Burn, Easter Aviemore Burn, Allt na Criche, Southern Avie Lochan Burn, Northern Avie Lochan Burn, Allt Cnapach, Fèith Mhòr and Allt Slochd Mhuic watercourses. Culverts with natural beds will be constructed, where possible. Where box culverts are being constructed, 300mm of suitable bed material is proposed. Mammal ledges will also be installed where required and will be designed to be above the 1 in 25 year flood level.
- 5.3.13. The majority of the culverts will be constructed offline from the existing culverts in order to maintain flows of the watercourses during construction. Minor local watercourse diversions at the inlets and outlets will also be necessary to allow offline construction. Cascades and plunge pools have been indicatively identified where required.
- 5.3.14. Access to culverts for maintenance inspection purposes will be provided either from stepped accesses from a hardstanding area in the verge of the A9 or via SuDS ponds maintenance tracks or local roads.
- 5.3.15. Typical culvert detail (box culvert and portal frame) is shown in Figure 5.9.

Non-motorised User Provisions

- 5.3.16. A number of Non-motorised User (NMU) provisions have been provided as part of the Proposed Scheme to facilitate existing travel patterns and further details are provided in Chapter 9 (Effects on all Travellers).
- 5.3.17. All proposed NMU Routes will have a minimum width of 2m. Headroom clearance of all underpasses will be based on usage and meet the minimum requirements stated in BHS Guidanceⁱ. As per the requirements of Roads for All (2013)ⁱⁱ, dwell areas (resting areas) will be provided at the three grade separated junctions to assist people with mobility impairments where the gradient exceeds 5%. Forestry tracks to the west of the A9 between Granish GSJ and Carrbridge will be widened and the vertical geometry smoothed.
- 5.3.18. An overview of specific NMU provisions and relevant figure references are provided as follows:
- There is a proposed NMU route (Figure 9.2 Sheet 1-2) to run alongside the A9 to connect with the NMU route that is part of a wider route that runs from Kingussie to Kincaig. This proposed NMU route is 3m wide and connects with Aviemore South GSJ and also provides a connection to Rights of Way (RoWs) HB45 and HB83 and Aviemore.

- At crossing point 1 (CP1) (Refer to Figure 9.2 Sheet 1) NMU access is to be retained via an improved underbridge (CP(A)) to enable widening of the A9 to dual carriageway;
- There is a proposed NMU route alongside Lynwilg Road crossing the new overbridge at Aviemore South GSJ (CP(B)) that replaces the existing at-grade crossing at CP2 (refer to Figure 9.2 Sheet 2);
- The NMU route at RoW HB83 will be formalised with an improved cross section and surfacing. A new widened underbridge is proposed at CP(C) (refer to Figure 9.2 Sheet 2) that will have a 2m wide footpath on the northern side and will connect to the footpath on the B9152;
- The underbridge at CP4 (refer to Figure 9.2 Sheet 2) providing access to Craigellachie NNR is retained/improved and the at grade crossing at CP5 is replaced with a new underpass at CP(D);
- A footpath is proposed at the B9152 (Figure 9.2 Sheet 3) on the approach to the Granish GSJ that links to RoW HB52 to the east and continues across the A9 via an underbridge to forestry tracks on the northbound side and RoW HB45 to the west;
- There is a proposed underbridge and access road for NMUs and vehicles at CP(J) to replace the at-grade crossing closures at CP12, CP13 and CP14 (refer to Figure 9.2 Sheet 5);
- A new vehicular access track will be provided to the west of the A9 between Kinveachy and Lethendry North and this will be available for use by NMUs (refer to Figure 9.2 Sheet 5);
- At grade crossings at CP14 and CP15 are closed and an underbridge provided at CP(K) that is shared use for NMUs and vehicles (refer to Figure 9.2 Sheet 5);
- An NMU and vehicle underbridge is proposed at Dalrachney Beag to replace the existing at-grade crossing of the A9 (CP17) (Figure 9.2 Sheet 6);
- The existing at grade crossing at Black Mount (CP18) will be closed and access across the A9 will be via Black Mount GSJ (refer to Figure 9.2 Sheet 7). The NMU Route has a minor diversion at Black Mount GSJ along the realigned road to the north of the junction and continues along the existing route via the U2400;
- There is a proposed underbridge (CP(N)) below the A9 320m to the east of the at-grade crossing at CP19 that will replace the existing CP19 (refer to Figure 9.2 Sheet 8);
- NCN7 / Core Path INV27.01 is realigned at Slochd LILO to accommodate the proposed road layout and widening. The new route will be on the U2400 before connecting onto the dedicated NCN7 adjacent to the northbound carriageway of the A9(refer to Figure 9.2 Sheet 8);
- NCN7 / Core Path INV27.01 is diverted adjacent to the southbound carriageway at Slochd Mor towards CP21 (refer to Figure 9.2 Sheet 8-9); and
- There is a proposed A9 underbridge (CP(P)) for the diverted NCN7 / Core Path INV27.01 to replace the existing A9 at grade crossing at CP21 (refer to Figure 9.2 Sheet 9).

Proposed Lay-bys

- 5.3.19. Lay-bys are designed in accordance with DMRB TD 69/07. It is proposed to construct 6No. Type A lay-bys on the northbound carriageway and 5No. Type A lay-bys on the southbound carriageway. The length of the lay-bys has been maximised as far as

possible based on an assessment of existing constraints. The location of the proposed lay-bys is as follows.

Table 5.2: Proposed Lay-bys

Proposed Lay-by No.	Lay-By Type	Start Chainage (m)	End Chainage (m)	Spacing to previous lay-by (m)	Length of Parking Facilities (m)	No. of Parking Spaces (6m long)	No. of HGV Spaces (20m long)
Northbound							
3a	A	1005	1380	9150	100	16	5
3	A	6315	6635	1935	45*	7	2
5	A	11800	12175	5165	100	16	5
6	A	14760	15135	2585	100	16	5
8	A	17460	17835	2325	100	16	5
10	A	20295	20670	2460	100	16	5
Southbound							
2	A	6230	6605	8575	100	16	5
4	A	12700	13085	6905	100	16	5
9	A	16095	16470	3010	100	16	5
12	A	20100	20475	3630	100	16	5
11	A	23370	23745	2895	100	16	5
Total					1045	167	52

*reduced length of lay-by to minimise impacts on Craigellachie NNR/SSSI

- 5.3.20. Lay-by 11, near Slochd Summit has been enhanced both in terms of its location which maximises geodiversity interest at the northern 'gateway' to the National Park, as well as provision of improved NMU connectivity through a direct link with NCN7 and Core Path INV27.01.

Proposed Traffic Signs and Lighting

- 5.3.21. Traffic signage requirements and detailing will be based on relevant design standards and will include bilingual signing in Gaelic. This will be developed at the detailed design stage and the appointed contractor(s) will consult with Transport Scotland, Cairngorms National Park Authority and The Highland Council with regard to traffic signage.
- 5.3.22. A signage strategy will be developed as part of the detailed design and this will consider the environmental impact of signage, particularly in terms of landscape and visual intrusion.
- 5.3.23. The lighting requirements and details are based on a full lighting assessment undertaken to DMRB and the Institute of Lighting Professional guidance taking cognisance of safety and security aspects in addition to environmental impact. Permanent lighting is proposed at the following locations:
- Grampian Road underbridge (ch. 4740) – Lighting of the private road underbridge is required.
 - Old Meall Road underbridge (ch. 7380) – Lighting of the public road underbridge is required.
 - The B9152, A95 and the compact junction connector road as they approach the roundabout at Granish – The extent of lighting on the compact connector road will be

up to and including the underbridge under the A9. No lighting is proposed on compact 'loops' or on the A9 itself.

- NMU / maintenance access underpass (ch. 23570).

Proposed Road Drainage

- 5.3.24. At present, the existing drainage networks discharge unattenuated flows from the existing A9 road corridor. Generally, kerbs, gullies and carrier pipes direct road runoff to the nearest watercourse.
- 5.3.25. The Proposed Scheme will incorporate a new road drainage system. The road drainage layout is shown on Figure 5.2 (Proposed Scheme Layout), with a typical SuDS detail provided as Figure 5.10.
- 5.3.26. Surface water runoff to the Proposed Scheme road drainage system derives from the road cross-section, including the carriageway and verges, together with the associated earthworks. Additional surface flow from runoff draining towards the Proposed Scheme from land outside the road corridor will be kept separate from the road drainage system where practicable.

A9 Carriageway and Junctions

- 5.3.27. The A9 carriageway is proposed to be drained by the use of filter drains, catchpits, and carrier drains discharging into a second level of SuDS. Road gullies or combined drainage and kerb blocks are proposed to drain the carriageway at lay-bys, overbridges, and other kerbed sections of carriageway. Grassed swales with an underlying filter drain are proposed where constraints prevent the levels of SuDS being constructed away from the carriageway edge.
- 5.3.28. The 34 networks draining the proposed A9 mainline will be subject to at least two levels of treatment, typically comprising filter drains and retention ponds, detention basins or swales prior to discharge to surface waters. Filter drains will generally be unlined in accordance with DMRB standards, but may be lined with an impermeable membrane in some embankment areas to reduce the risk of exfiltration and seepage within the embankment or where sensitive groundwater receptors are present, subject to further review at detailed design stage. Opportunities to incorporate set-back outfalls, in the form of a short ditch or swale, have been considered where appropriate in order to provide additional water quality and habitat benefits.

Local Road and Access Tracks

- 5.3.29. Local roads are generally to be drained via 900mm deep drains or filter drains where space is constrained. Cross-carriageway connections between ditches will be appropriately sized for ease of maintenance. Additional SuDS requirements have been determined in line with SEPA guidelines, using the Simple Index Approach in SuDS Manual (C753, 2015)ⁱⁱⁱ

Earthworks/Land Drainage

- 5.3.30. A series of pre-earthworks ditches will be used to control surface water run-off from embankments, cuttings, existing hillside etc. and where existing ground profiles require them to act as cut off drains in order to contribute to controlling run-off.
- 5.3.31. Greenfield runoff from embankment slopes will discharge to filter drains or ditches constructed at the toe of embankments. In addition, where seepages are envisaged, earthworks slopes are proposed to be drained via filter trenches.

- 5.3.32. Ditches may require to be lined as appropriate in sympathetic materials to suit velocity and longitudinal gradients for scour and erosion control.
- 5.3.33. Not all proposed embankments will require earthworks drainage, generally those less than 2 metres high will not need drainage, however, this is dependent on local ground conditions and the construction of the engineered embankments.

Attenuation SuDS

- 5.3.34. Retention ponds, detention basins or infiltration basins are proposed for catchment areas requiring control of peak flow and discharge volume. A sediment forebay is proposed for all retention ponds and detention basins to allow coarse sediments to settle out.
- 5.3.35. Retention ponds shall include a number of micro-pools to create a wetland environment of variable depth with suitable planting to provide pollution reduction and habitat creation for birds and invertebrates. Permanent treatment volumes within retention ponds have been sized in accordance with the SuDS Manual (C753, 2015)^{iv} variable rainfall depth method, which aims to treat runoff from 90% of all rainfall events. Detention and infiltration basins will be vegetated with suitable planting to provide appropriate pollution reduction as well as promoting habitat creation.
- 5.3.36. SuDS access tracks are provided to the inlet and outlet, and around the perimeter wherever possible. This aims to ensure that sufficient space is provided at an appropriate gradient to allow access to maintenance workers and machinery. In retention ponds, additional features include submerged benches around the perimeter of micro-pools where aquatic and emergent vegetation can be established. The submerged benches also provide a safety zone before deeper open water is reached.

Proposed Watercourse Crossings and Realignment

- 5.3.37. Single span bridges with abutments set well back from watercourse banks are required at several watercourse crossings within the Proposed Scheme extents. Where a clear span structure has not been deemed necessary, an extended or new culvert will be required. Good practice design for culverts includes: a natural bed substrate, a low flow channel, allowance for fish passage, bank protection where necessary, appropriate inlet and outlet structures and provision of scour pools at the outlet of the culvert to dissipate energy and provide resting areas for fish.
- 5.3.38. The need for major watercourse realignments has been avoided or minimised where possible. Some of the new or extended crossings do however require some adjustment of the watercourse planform or gradient to align the existing watercourse through the proposed culvert or bridge. These realignments will be designed and constructed with consideration to bed and bank erosion, sediment movement and fish passage. Cascade features or step-pool features will be designed where the channel gradients are steep (>3-4%) and velocities need to be dissipated. The proposed cross sections will reflect natural dimensions incorporating a low flow channel within a 2-stage channel so flood flow capacity (1 in 200 year flow plus climate change) can be accommodated. The tie in to the existing watercourse upstream and downstream (dictating the realignment length) will largely be determined by the surrounding topography and the need to avoid excessively steep (and geomorphologically unsustainable) channels. Hard (grey) bank protection will only be suggested where the erosion risks are high and cannot be adequately mitigated through design and/or green protection measures.
- 5.3.39. Further details regarding watercourse crossings and realignments are provided in Appendix 11.2 (Hydromorphology).

Proposed Earthworks

- 5.3.40. Embankments or cuttings are required where the Proposed Scheme is higher or lower than the surrounding ground level. The slope gradient of embankments has been considered in order to achieve a best fit within the surrounding landscape, with slope profiles steepened or slackened in several locations. Details of proposed slope gradients are provided in Chapter 13 (Landscape) and in Appendix 13.1 (Slope Profiling).

Proposed Fencing and Environmental Barriers

- 5.3.41. Any deer fencing along the road boundary over the extents where it currently exists will generally be replaced to the current standards.
- 5.3.42. Temporary fencing will be erected where required prior to the commencement of construction to secure the area and this will be determined by the appointed contractor.
- 5.3.43. Where a requirement has been identified within this ES, environmental barriers will be incorporated to provide mitigation to protect mammals (for example otter fencing). Refer to Chapter 12 (Ecology) and Chapter 21 (Schedule of Environmental Commitments) and Figure 13.4.

Proposed Road Surfacing

- 5.3.44. A Low Noise Road Surface will be applied to the new dual carriageway within the Proposed Scheme extents. The surface material will provide a road surface noise correction of -3.5dB(A). The final specification will be in accordance with current standards and Transport Scotland requirements.

5.4. Construction

- 5.4.1. This section provides an overview of the envisaged construction programme and typical construction activities.
- 5.4.2. 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 no greater than those described in the ES, and that commitments given in the ES are adhered to (or measures providing equivalent mitigation, subject to agreement with Transport Scotland).

Construction Period

- 5.4.3. The EIA assumes that construction will commence in 2021 and continue for an estimated 48 months, on a continuous basis. The construction commencement date and programme is dependent on the duration of statutory processes and procurement.

Construction Programme

- 5.4.4. The Contractor will be required to provide a detailed programme prior to commencement of the works. This will set out:
- the overall programme of construction;

- programming of the key elements and phases of construction; and
- the duration of each element and phase.

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

Outline Construction Programme

5.4.6. For the purposes of the environmental assessment the approximate duration of construction activities has been estimated and an outline of the possible timing of works indicated in Table 5.3 below.

Table 5.3: Indicative Timescales for Construction

Works Activity	Estimated Duration
Traffic Management	48 months, as required
River Dulnain Structure	12 months
Slochd Beag Structure	24 months
South tie in to Aviemore	12 months
Aviemore to Black Mount	30 months
Black Mount to north tie in	36 months
Rock Excavation at Slochd (Blasting)	Circa 80 weeks*

*duration highly subject to environmental restrictions and weather conditions.

Typical Construction Activities

5.4.7. Key construction activities associated with the Proposed Scheme are indicated in Table 5.4 below.

Table 5.4: Indicative Construction Activities

Section	Construction Activities
Possible Advance Works	<ul style="list-style-type: none"> • Environmental mitigation to be implemented in advance of the main construction contract. • Advance services diversions. • Archaeological investigations and excavations.
Roadworks	<ul style="list-style-type: none"> • Site establishment and plant compounds at strategic locations. • Temporary and permanent fencing. • Site clearance and demolition. • Temporary and permanent surface water outfalls. • Service diversions. • Topsoil stripping and storage. • Pre-earthworks drainage. • Earthworks (cuttings and embankments). • Soil nailed slopes. • Rock cuttings. • Environmental bunds and landscaping. • Drainage, service ducts and chambers. • Topsoil spreading, seeding and turfing. • Pavement construction. • Roadwork finishes including safety barriers, signs, road markings. • Accommodation works.

Structures	<ul style="list-style-type: none"> • Site establishment and plant compounds at strategic locations. • Temporary and permanent fencing. • Site clearance and demolition. • Foundations, conventional and /or piles. • Construction of river crossings. • Bridge construction. • Culvert construction. • Retaining wall construction.
Environmental	<ul style="list-style-type: none"> • Earthworks mitigation. • Landscape and ecological mitigation planting. • Permanent diversion of watercourses. • Peat restoration.
Temporary Works	<ul style="list-style-type: none"> • Temporary works to facilitate bridge construction. • Temporary soil nailing and / or ground anchors. • Temporary carriageway to maintain traffic flows where roads are narrow or are affected by construction of the scheme. • Narrow lanes, contraflows or lane / road closures. • Temporary route diversions or traffic hold points to divert traffic flows during key project events. • Temporary diversion of watercourses to facilitate culvert and structure construction. • Temporary construction drainage.
Maintenance	<ul style="list-style-type: none"> • Landscaping maintenance. • Pavement rehabilitation and other routine maintenance and defects repair works. • Asset inspection and maintenance • Winter maintenance.

Working Hours

- 5.4.8. Normal working hours are anticipated to be Monday to Friday 0700 to 1900hr, Saturday 0700 to 1200, and no Sunday working and will be agreed with The Highland Council.
- 5.4.9. The contractor may wish to carry out certain operations outside of these hours. For example, the construction of bridges over minor roads may involve temporary, weekend road closures to facilitate the lifting into position of prefabricated elements or occupations of the railway to construct new structures. These hours may need to be restricted. Such extensions beyond normal working hours would be dependent on the contractor's proposed methods of construction, and subject to agreements with Transport Scotland and CNPA/The Highland Council.
- 5.4.10. Normal working hours may also need to be reduced/restricted to shorter time periods in certain areas/for certain activities - for example to avoid impact on sensitive ecological receptors, working after dusk or before dawn may not be permitted. Furthermore, works undertaken adjacent to the Highland Mainline Railway may also be subject to further restriction and will be agreed with the network operator.

Land Requirements

- 5.4.11. Most construction work will take place within the limits of the land made available (LMA) to the contractor as defined within the contract documents. An indicative LMA has informed the land take, habitat and woodland loss calculations undertaken for assessment purposes in this ES. This includes land for all the permanent works as well as land for construction phase SuDS. Land for topsoil, peat and material storage has not been identified within the LMA as this will be a matter for the Contractor to determine based on their construction methodology and the mitigation principles set out in the ES. The final LMA would include land acquired under Compulsory Purchase Order (CPO),

land the Scottish Ministers already have ownership of or access to and other areas the Contractor has acquired by agreement to facilitate construction.

- 5.4.12. The land to be acquired includes land necessary to construct 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 impacts within the ES.

Construction Site Compounds

- 5.4.13. The identification of site compounds and storage areas will be the responsibility of the Contractor. Should the Contractor wish to acquire land outside the land identified on the CPO for construction compounds, the Contractor will be required to obtain the relevant consents, where required, and the agreement of the applicable landowner. This also applies to any other land required outside the CPO for temporary works, including access routes and haul roads.

Construction Environmental Management Plan (CEMP) and Peat Management Plan

- 5.4.14. The Contractor will be required to produce and maintain a Construction Environmental Management Plan (CEMP) as part of the contract for the proposed works. The CEMP will outline the proposed measures to minimise and mitigate the construction impacts of the Proposed Scheme in accordance with the ES. The measures will address management of construction related traffic, noise and dust suppression, working margins and methods related to historic features, sensitive habitats and species and watercourses.
- 5.4.15. The 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 Contractor's Environmental Manager/Clerk of Works will oversee all environmental activities during the construction phase.
- 5.4.16. All activities on site will be reviewed against the requirements of the CEMP via an integrated risk assessment and method statements procedure. The Contractor's Site Manager will review environmental risks associated with the construction process and appropriate control measures included in method statements and field control sheets.
- 5.4.17. Regular audits will be undertaken to verify that the project is compliant with the established CEMP, contractual requirements and legislation.
- 5.4.18. The Contractor's Environmental Manager will carry out regular assessments of the project's environmental performance.

Traffic Management

- 5.4.19. The Contractor will be required to develop and agree a Traffic Management Plan (TMP) with Transport Scotland and its Maintenance Operating Contractor, Police Scotland, and The Highland Council 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.

- 5.4.20. Some temporary road closures may be unavoidable during construction to allow for realignments, blasting and/or bridge construction.
- 5.4.21. Haulage routes will be permitted across side roads within the site boundaries. Access will be permitted at side roads for the construction works associated with the Proposed Scheme. Similarly, access will be allowed at these locations for site workers to access the site going to / from work.
- 5.4.22. The Contractor will be responsible for remedying any construction related damage to roads or paths in the vicinity of the works to the satisfaction of Transport Scotland and CNPA / THC.

Earthworks Balance and Materials Requirements

- 5.4.23. The Proposed Scheme includes substantial sections of cutting and embankment which have been designed to minimise the impact on the surrounding topography whilst achieving the required design standards. Where practicable, excavated material will be re-used in areas of proposed fill.
- 5.4.24. The Proposed Scheme earthwork balance indicates a surplus of excavated material most of which is generated from the Slochd area.
- 5.4.25. A summary of the quantities (based on the engineering assessment) is detailed in Tables 5.5 to 5.7 below.

Table 5.5: Summary of Estimated Excavation Quantities

Soil Class	Quantity (m ³)
Soils / general fill	1,407,013
Unsuitable soil (peat)	53,020
Topsoil	317,169
Rock cut	200,000
Other rock, concrete and existing road arisings	99,406
Total	2,076,608

Table 5.6: Summary of Estimated Fill Quantities

Soil Class	Quantity (m ³)
Soils / general fill	1,239,808
Topsoil	351,124
Pavement subbase and capping	482,537
Total	2,073,469

Table 5.7: Summary of Estimated Earthworks Balance

Import / Export	Quantity (m ³)
Estimated Import	502,933 soils 183,131 aggregate
Estimated Export	602,999 soils (worst case)

- 5.4.26. A review of results from the ground investigation indicates that substantial volumes of peat, topsoil, superficial deposits and rock will be excavated and will be suitable for re-use. Pre-treatment measures under consideration include reducing volume and improving the mechanical properties of peat by de-watering and then mixing with peaty soils.
- 5.4.27. Excavated peat and peaty soils across the scheme will, depending on suitability, be re-used as part of the landscape proposals. This is further detailed in Appendix 10.3 Outline Soil and Peat Management Plan.
- 5.4.28. Wherever possible, site derived materials for re-use in structural or landscape earthworks will be directly transferred from areas of cut to areas of fill. Where there is a requirement for temporary stockpiling of materials they will be appropriately stored (i.e. so that they do not degrade) in designated and contained areas away from sensitive locations such as marshy areas, watercourses, flood areas, or close to property, where dust during dry periods could be disruptive to local residents.

Disposal and Import of Materials

- 5.4.29. Appendix 10.3 (Outline Soil and Peat Management Plan) sets out the approach to the re-use of excavated materials within the Proposed Scheme boundary.
- 5.4.30. The identification of approved receptor sites for the disposal of any excess materials associated with earthworks and the import of bulk materials required to make up design levels will be the responsibility of the Contractor (see Chapter 18: Materials for further consideration of disposal sites). The Contractor will be required to meet all legal obligations relating to licensing and planning approvals if required.
- 5.4.31. Where such import and export of materials is required, haulage routes will be subject to agreement under the required project Traffic Management Plan. Specific consideration will be given to the potential sensitivity of communities located along potential haul routes.

Construction Phase SuDS

- 5.4.32. The following activities are assumed to aid erosion and sediment control during construction:
- Construction of pre-earthworks diversion drains/ditches;
 - Early use of attenuation ponds as sediment basins. This may also require the complete reinstatement of these components once construction is finished;
 - Construction of additional sediment basins where required to provide for temporary retention of runoff from disturbance areas;

- Construction of collection drains (downslope of or within disturbance areas), bunds and slope drains where required to convey runoff to sediment basins or other storages; and
- Construction of sediment fences and filters (e.g. straw bale filters) downslope of construction and stockpile areas where required.

5.4.33. Whilst the above activities are generally detailed within the Contractor's CEMP, indicative estimates of sediment basin sizes and locations have been calculated in order to help identify areas of land for the purposes of erosion and sediment control with respect to the assumed construction sequence of the scheme design.

Piling and Blasting

Blasting

5.4.34. Substantial rock cuts will be required at Slochd adjacent to the A9 southbound carriageway. The findings of ground investigations and field mapping of existing rock exposures have shown that blasting will be required in order to excavate the rock at Slochd.

5.4.35. Based on the ground investigation information to date, three locations have been identified as requiring blasting to excavate rock (although blasting may also be necessary at other locations). These are:

- Slochd Beag (ch. 21800 – ch. 22150);
- Slochd Mor (ch. 23200 – ch. 23400); and
- Slochd Summit (ch. 23800 – ch. 24200).

5.4.36. The quantity of rock to be excavated at each of these locations has been based on the available ground investigation data and is anticipated to be:

- Slochd Beag, 150,000 tonnes;
- Slochd Mor, 100,000 tonnes; and
- Slochd Summit, 150,000 tonnes.

The total volume of rock from these areas is circa 200,000m³.

5.4.37. A site-specific blast strategy and design will be developed for each of the three locations that takes account of differences in the geological structure, proximity to environmental receptors, and proximity to neighbouring infrastructure.

Piling

5.4.38. Foundations for the proposed structures shall comprise a combination of conventional spread footings and piled foundations. The final foundation solution will be dependent upon ground conditions and structure arrangements. Piled foundations will be required where low strength materials and / or substantial loads are generated by the structures. Notable piled structure locations are likely to comprise the River Dulnain and Slochd Beag.

5.4.39. The final pile type and number thereof will be dependent on the ground conditions and the loads generated but will include a combination of bored, concrete cast in situ and driven pre-cast or steel piles.



- 5.4.40. Sheet piling may also be required across the scheme as part of temporary works proposals. The design of the temporary works shall lie with the appointed contractor(s) such that they can optimise solutions against detailed design, programme and site conditions.
- 5.4.41. Based on the mapping reviews and ground investigation information obtained to date extensive peat bog areas have been identified in proximity to the scheme. A solution for the construction of the new carriageway and any structures over such areas shall be developed in accordance with the peat management plan. As part of the management plan, piling of the road and / or structures may be required to minimise engineering risk posed by the highly compressible peat and disturbance to the peat. Where this solution is adopted, piles will likely comprise driven pre-cast concrete or steel piles and shall be combined with a load transfer platform.

ⁱ British Horse Society (2016); Road Crossings for Horses.

ⁱⁱ Transport Scotland (2013); Roads for All Good Practice Guide for Roads.

ⁱⁱⁱ CIRIA (2015); The SuDS Manual (C753).

^{iv} CIRIA (2015); The SuDS Manual (C753).