Appendix 5.1

Construction Details

Contents

Tables

Figures

Photographs

1 Introduction

1.1 Construction Overview

1.1.1 Construction activities required to build the Proposed Scheme are considered as 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

1.1.2 Whilst a summary of these construction activities is provided in **Chapter 5** of the Environmental Statement (ES), more details relating to the likely programme of works, phasing and construction activities are set out in this Appendix. These represent the assumptions on which the Environmental Impact Assessment (EIA) has been based.

2 Construction Programme

2.1 Overall Programme

2.1.1 The EIA of the Proposed Scheme has been undertaken based on an anticipated construction programme of 30 months (c. 2.5 years). A detailed construction programme will be developed by the Principal Contractor; however, the assessment considers that the following 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

2.2 Phasing

2.2.1 It is anticipated that the Proposed Scheme will be constructed in 3 phases:

- Phase One – Site access and temporary routes
- Phase Two – Traffic transfer and construction of southbound carriageway
- Phase Three – Traffic transfer and construction of northbound carriageway

Phase One

2.2.2 Phase One will require preliminary works to establish access to the site and provide a safe working environment during construction.

2.2.3 Given the constrained nature of the Proposed Scheme, the assessment has not considered potential site compound locations. These are left to the Principal Contractor to identify, negotiate and assess any environmental issues to ensure regulatory compliance.

2.2.4 It is possible that the existing lay-by on the eastern (southbound) side of the A9, south of the Drumochter Pass at ch. 4,000, could be considered by a Contractor as this area was previously used as a compound by SSE during construction of the Beauly to Denny Power Line.

2.2.5 Works traffic attempting to enter any works compound may have to perform a right turn manoeuvre across the existing A9 to do so. In such situations, the Contractor would be required to devise and operate an appropriate safety system, potentially including temporary traffic signal controls. A traffic signal controlled crossing would require consultation with the Trunk Road and Bus Operations department of Transport Scotland and the Trunk Road operator (currently BEAR Scotland) prior to installation.

2.2.6 During Phase One it is envisaged that an access track will be constructed from the existing southbound lay-by at approx. ch. 4,000 to approx. ch. 4,620 to permit construction traffic to access the proposed southbound carriageway worksite from the existing lay-by.

2.2.7 The existing NCN7 will be closed and a shuttle service provided through the extent of the works. This will exclude NMUs from the works site, whilst still providing continuity of the route, allowing NMUs to continue their journey once clear of the works.

2.2.8 Narrow lanes will be installed on the existing A9, reducing lane widths to 3.25m and moving traffic over to the east side of the carriageway. This will maximise the available space between the trafficked A9 and the NCN7.

2.2.9 Closure of the existing NCN7 and narrowing of the live A9, will provide sufficient space for the construction of a temporary carriageway with 3.25m lane widths to the west of the existing A9 closely following the fence-line of the Highland Main Line railway (HML). This temporary carriageway would run from ch. 4,800 to ch. 5,900. Traffic would be diverted on to this temporary carriageway to allow construction of the new southbound carriageway.

Phase Two

2.2.10 The end of Phase One and start of Phase Two will require the transfer of traffic from the existing A9 to the new temporary road. This will likely require lane closures and possible overnight road closures to tie the new temporary road into the existing A9.

2.2.11 Once traffic is transferred to the new temporary carriageway, the access track will permit plant to access the isolated section of existing A9, which will act as a haul road and temporary materials storage/ laydown area.

2.2.12 The installation of rotary cored pile retaining walls RW7 and RW8 and precast concrete retaining walls RW6 and RW9 first will subsequently allow the excavation of material in front of the wall, watercourse diversion channels and earthworks grading behind the wall to be completed. Suitable material from this excavation will be used to raise the existing ground level to the required level for the southbound carriageway. **Figure 1** below shows the proposed cross section during construction of the southbound carriageway.

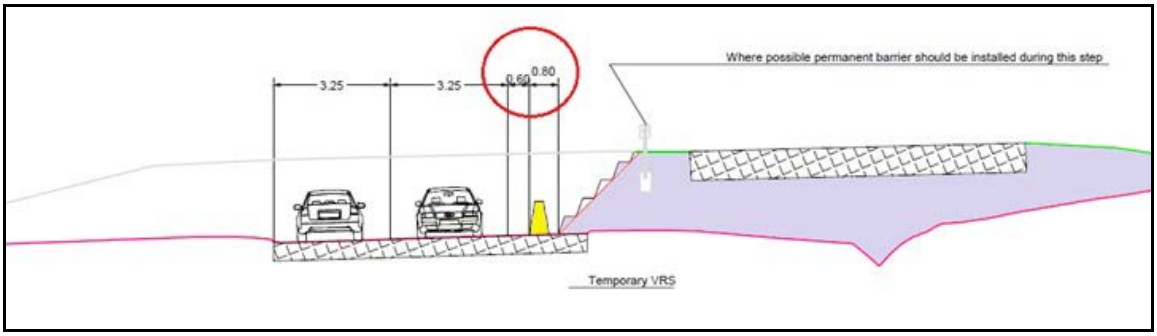

Figure 1: Proposed cross section showing construction of southbound carriageway

2.2.13 The proposed southbound carriageway will terminate as close as possible to the tie in with the existing A9, minimising the length of carriageway required to be constructed to transfer traffic from the existing A9 and temporary road to the new southbound carriageway, and thus the time required to complete this part of the works.

2.2.14 As per the transition from Phase One to Phase Two it is proposed that the tie in works be undertaken with lane closures or possible overnight road closures. **Photograph 1** below shows a situation with a level difference between a carriageway under construction and the live traffic.

Photograph 1: Photograph of split carriageway construction at Kincraig to Dalraddy

Phase Three

2.2.15 Phase Two to Phase Three requires the transition of A9 traffic from the temporary road to the new southbound carriageway.

2.2.16 Once A9 traffic is transferred to the southbound carriageway the temporary road will be removed. The bituminous material of the temporary road surface should be recycled and any fill material used for the construction of the northbound carriageway to minimise waste.

2.2.17 Partial excavation of the existing A9 will be required for construction of the retaining structure in the northbound verge that will support the northbound carriageway Vehicle Restraint System (VRS) (e.g. safety barrier) and separate from the NCN7. It is anticipated that this structure would be comprised of precast elements that can be brought to site and installed efficiently. Material from the excavation of the void to construct the structure will be used as backfill with any excess used for the northbound carriageway.

2.2.18 As soon as the retaining wall for the northbound carriageway VRS is completed, the NMU and maintenance access track can be constructed. This could then be used to facilitate movement through the site.

2.2.19 Once the northbound carriageway is complete traffic will be transferred from the southbound carriageway to the northbound. This will leave the southbound carriageway available for construction traffic to complete the online widening to the east from ch. 5,900 to ch. 6,900, should the contractor choose not to construct this section at the same time as the Drumochter Pass.

Junctions

2.2.20 The Proposed Scheme includes two junctions to provide for local access at Dalnaspidal and Balsporran Cottages/ Drumochter Lodge. It is considered that construction of these junctions could be phased as set out below.

Dalnaspidal Junction

2.2.21 Initial work is likely to concentrate on construction of the southbound elements of the Dalnaspidal Junction and the new vehicle underbridge. The existing access to Dalnaspidal would be maintained, and a temporary access track would be provided to the east allowing landowner and construction access to the hillside behind the junction location.

2.2.22 Once the southbound half is complete, traffic would be transferred resulting in two-way traffic flow on the new southbound carriageway, using reduced lane widths. This then enables new northbound carriageway and northbound half of the Dalnaspidal Junction to be constructed.

2.2.23 At this point the underbridge could be used for construction traffic and as a haul route. Once works further to the north were complete and the haul route no longer required, traffic would move onto the new carriageway and the temporary access to the hillside would be removed.

Balsporran/ Drumochter Junction

2.2.24 Initial work is likely to concentrate on construction of the northbound elements of the Balsporran Cottages/ Drumochter Lodge Junction and the new vehicle underbridge, whilst existing accesses to Balsporran Cottages and Drumochter Lodge would be maintained.

2.2.25 Once the northbound half is complete, traffic would be transferred resulting in two-way traffic flow on the new northbound carriageway, using reduced lane widths. This then enables the new southbound carriageway and southbound half of the Drumochter Lodge Junction to be constructed.

2.2.26 Once the junction at Drumochter is complete it could be used for construction traffic/ as a haul route. This would require a temporary carriageway constructed slightly offline from the existing northbound at ch. 5,500 to facilitate construction of the new southbound carriageway, which is some 3m above existing. Significant level differences would also require a temporary carriageway to be constructed at crossover points.

2.2.27 Once works further to the north were complete and the haul route no longer required, traffic would move back onto the new carriageway.

3 Construction Activities

3.1 Plant and Equipment

3.1.1 It is assumed that the contractor will use a variety of plant and equipment for the anticipated construction activities, as set out in **Table 1** below:

Table 1: Typical Construction Plant

Activity	Plant	Quantity
1, Site Clearance	Petrol engined chain saw (sawing timber)	1
	Tracked Excavator	4
	Lorry	4
	Wheeled Excavator	4
2, Compound Construction	Wheeled Backhoe Loader	1
	Lorry	1
	Vibratory Roller	1
3, Compound Operation	Diesel Generator	1
	Dumper	2
	Wheeled Backhoe Loader	1
	Lorry	1
4, Stock Proofing	Tractor (towing trailer)	1
	Post Rammer	1
	Hand-held circular saw	1
	Nail Gun	1
5, Pre-Earthworks Drainage	Tracked Excavator	2
	Wheeled Mobile Crane	1
6, Earthworks General	Tracked Excavator	2
	Articulated Dump Truck	3
	Dozer (41t)	2
	Lorry	4
7, Earthworks, rolling and compaction	Mini excavator with hydraulic breaker	1
	Dozer (41t)	1
	Lorry	2
8, Rock Breaking	Pulveriser mounted on excavator	2
	Tracked Excavator	2
	Dozer (41t)	2
	Dump Truck	1
9, Sub Formation	Tracked Excavator	2
	Dozer (towing roller)	2
	Articulated Dump Truck	3
	Roller (rolling fill)	2
10, Drainage	Tracked Excavator	2
	Wheeled Mobile Crane	1

Activity	Plant	Quantity
11, Paving	Asphalt Paver	2
	Vibratory compactor	2
	Lorry	2
	JCB Airmaster	1
	Pneumatic Breaker	1
12, Central Reserve	Dozer (towing roller)	2
	Wheeled Excavator	4
	Hand held Circular saw	1
13, Road Marking	Lorry	2
14, Signage	Hydraulic Hammer Rig	1
	Wheeled mobile crane	1
	Gas Cutter	1
	Lorry	2
15, Existing Structure Demolition	Petrol hand held Circular Saw	1
	Pulveriser mounted on excavator	2
	Wheeled mobile telescopic crane	1
	Lorry	1
16, Bridge Foundation Construction	Crawler Mounted Rig	1
	Tracked Excavator	1
	Concrete Pump & cement mixer truck	1
	Concrete Mixer Truck	1
	Petrol HH Circular Saw	1
	Lorry (44t)	1
	Wheeled mobile crane	1
	Wheeled mobile telescopic crane	1
	Diesel Generator	1
17, Bridge Abutment	Petrol hand held Circular Saw	1
	Wheeled mobile telescopic crane	1
	Lorry (44t)	1
	Tracked Excavator	2
	Concrete Mixer Truck & Truck Mounted Concrete Pump	1
	Poker Vibrator	1
	Vibratory Tamper	1
18, Bridge Deck	Lorry (44t)	1
	Wheeled mobile telescopic crane	2
	Concrete Mixer Truck & Truck Mounted Concrete Pump	1
	Compressor	1
	Poker Vibrator	1
	Vibratory Tamper	1

3.2 Anticipated Activities

Site clearance

3.2.2 Site clearance will involve the phased removal of existing vegetation such as required tree felling and removal of hedges, bushes and undergrowth; demolition of any built features to be removed; removal and relocation of pipelines and services; and removal of existing fencing.

3.2.3 **Chapter 12** of the ES sets out a number of ecological constraints to site clearance, which the contractor will need to adhere to. These are also contained in the Schedule of Environmental Commitments (**Chapter 21**) and will inform the contract documents.

Compounds

3.2.4 The Contractor will need to create works compounds to provide site accommodation for staff, i.e. parking, offices and welfare facilities, as well as areas for storage of materials and plant. At DMRB Stage 3 it is not possible to determine where a Contractor would prefer to locate works compounds, and this is left to the Contractor to agree with local landowners and secure any relevant permissions/ consents from environmental regulators and planning authorities. This would include any work required to level areas for site compounds, install any necessary services and create access and egress points. Works compounds are not therefore considered within the Proposed Scheme under assessment.

3.2.5 Nonetheless, the Proposed Scheme includes some land within the temporary works boundary which is potentially suitable for compound location. As discussed above, the existing southbound lay-by at approx. ch. 4,000 was previously used to provide a compound location for Beauly-Denny Powerline (BDL) construction.

Stockpiling

3.2.6 Where material is excavated but will be re-used in the creation of permanent embankments and landforms, it will be stockpiled and/ or taken off-site for storage. It should be possible to incorporate the majority of excavated material into areas of landscaping subject to material being free from significant contamination and being capable of being placed, trafficked and maintaining the required surface profile. Material which cannot be re-used on site will be sent to an appropriately licensed or registered exempt site elsewhere, or segregated and sent for recycling or recovery at a materials recovery facility.

Stock Proofing

3.2.7 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.

3.2.8 It is anticipated that fencing will be erected following accurate ground surveys to delineate the areas required, prior to works commencing. The ground surveys will be undertaken along the line of the temporary works boundary, as shown in **Drawings 5.2** to **5.8** (in **Volume 3**). Whilst additional land may be acquired through the CPO process for mitigation purposes, the Contractor will determine the extent of temporary stock-proof fencing required.

Pre-earthworks drainage and temporary SuDS

3.2.9 A principal concern raised by SEPA through the A9 Dualling Environmental Steering Group (ESG) was ensuring the provision of sufficient land for construction stage sediment controls, i.e. temporary SuDS such as settlement lagoons. Construction stage drainage control arrangements, providing storage and attenuation for surface water run-off will be prepared by the Contractor, including a Pollution Prevention Plan, for SEPA approval under Controlled Activities Regulations.

3.2.10 Whilst the design and installation of temporary SuDS will be the responsibility of the Contractor, the Proposed Scheme includes land for temporary treatment and attenuation facilities. These areas could also be used to accommodate enhanced mechanical/ chemical settlement processes if local ground conditions are not suitable for infiltration processes.

3.2.11 Temporary SuDS are likely to be located at natural low points in the Scheme in proximity to temporary earthwork drains and at most watercourse crossings. Where space allows, temporary

SuDS will be in different locations from the proposed permanent SuDS features; however, it is recognised that the constrained nature of the Scheme means that phased use of permanent SuDS locations may be required.

3.2.12 Construction of the temporary SuDS will likely require excavation of material, and stockpiling/ placement of fill, where SuDS basins are to be provided. In some cases where there is not sufficient space within the Proposed Scheme extents, temporary drainage tanks may be provided above ground.

3.2.13 Pre-Earthworks Drainage (PED) systems, to intercept hillside, cutting and embankment runoff are also 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 routed directly to a local watercourse within the natural catchment.

3.2.14 PED is provided predominantly by means of interceptor ditches at the top of cutting slopes and at the toe of embankment slopes to intercept sheet flows from adjacent natural catchments in advance of the embankment/ cutting slope. PED will be sized to accept flows from the contributing natural catchment and installed at a longitudinal gradient to discharge to a suitable receiving watercourse via an outfall. The use of PED to intercept flows from embankment slopes will help prevent flooding of adjacent land.

3.2.15 PED systems which intercept runoff from outside the route corridor and runoff from road embankments, is uncontaminated and does not require SuDS treatment. PED systems may therefore discharge to the local watercourse within the same natural catchment concerned.

Earthworks

3.2.16 In the first instance topsoil will be stripped off, which would typically be undertaken in phases to a depth defined for each location. It will either be stockpiled on site or removed for storage, depending on the need for reused topsoil at any one time.

3.2.17 Embankments will then be created to specifications set out at the detailed design stage. The heights of the embankments vary across the Proposed Scheme due to the topography of the area and existing infrastructure. The maximum embankment height is not anticipated to exceed 20m.

3.2.18 It is assumed that the majority of the embankments along the Proposed Scheme would be constructed from fill material generated on site from cuttings within the Proposed Scheme, although a proportion of imported fill material may also be required.

3.2.19 It is considered that embankments constructed from site won material may be constructed with side slopes of between 1V:2H and 1V:3H, depending on the height of the embankments.

3.2.20 The design also includes a section of reinforced earth embankments, with slopes up to around 1V:1H in order to avoid the NCN7 cycle track to the west of the existing carriageway between approximate ch. 2,500 – ch. 2,750, and a section of reinforced earth to construct the split carriageway through Drumochter Pass.

3.2.21 The Proposed Scheme is anticipated to cross areas of peat, made ground, silt or clay. Any peat, made ground, soft clay or silt that is encountered under embankments will be excavated and replaced with a suitable engineered fill. With the exception of areas to the west of the mainline alignment in the Pass of Drumochter and near Balsporran (ch. 3,900 to ch. 4,050, ch. 4,250 to ch. 4,300 and ch. 7,100 to ch. 7,200) where peat is locally present up to 4.00 and 8.00m depth; peat underlying embankments is typically less than 2.00m thick, and construction directly on top of the peat would result in excessive settlements.

3.2.22 For the purposes of the assessments in **Chapter 10** and **Chapter 18**, it has therefore been assumed that where peat is encountered beneath infrastructure along the route, it would be treated by excavating and replacing the material. However, as a worst-case assumption possible piling locations have been assessed, as discussed in more detail below.

3.2.23 Generally, when the depth of peat consistently exceeds 2.00m, it may be considered more economical to pile embankments, rather than excavate and replace the material. The depth of peat is anticipated to consistently exceed 2.00m to the west of the mainline alignment between ch. 3,900 and ch. 4,050, ch. 4,250 and ch. 4,300 and ch. 7,100 and ch. 7,200. Peat conditions and depths in these areas may therefore permit the use of piling techniques, which would involve laying of a 'piling mat' over the peat, through which piles are driven to reach a stratum of suitable bearing capacity, without excavations taking place. The road is then constructed on the piles.

3.2.24 The technique of floating roads is usually reserved for access tracks, private and low traffic-volume roads, but provide a good option for these over deeper peat (typically >1.00m). The depth of peat in relation to access tracks is anticipated to consistently exceed 1.00m beneath the proposed re-alignment of the NCN7 cycle track to the west of the A9 mainline, between ch. 3,850 and ch. 4,100. As such, peat conditions and depths in this area may permit the use of floated track techniques. Floating tracks can be described as a track that is constructed directly on top of the peat, relying on the strength of the in-situ peat for its support. The track does not actually 'float' on the peat, rather, an equilibrium builds up between the weight of the track and the in-situ strength of the peat, whereby the combined system comes into balance. Modern construction practice generally calls for a geosynthetic layer to be placed on the surface of the peat, before the track is constructed, to give a working platform for the track and provide a separation layer between it and the peat below.

3.2.25 Ground investigations also show that occasional or frequent large boulders and cobbles are present in glacial and alluvial deposits and may need to be broken up using hydraulic breakers or be over-excavated and removed. Excavations within peat and made ground are likely to require short-term support to ensure stability.

Material transfer

3.2.26 It is anticipated that the Contractors will use 40 tonne moxy-type vehicles for earthwork material movement. The number of vehicles will be up to the contractor and the movements will depend on the phasing of works and whether they stockpile or place directly.

Rock cuts and rock breaking

3.2.27 Rock slope stability has been assessed using discontinuity data from logging of the existing rock slope exposures and from televiewer data obtained during Ground Investigations (GI). The data available at this stage is limited so further re-assessment of rock slopes is likely to be required.

3.2.28 Nonetheless, an assessment of anticipated excavation types has been carried out. Based on limited GI data, a preliminary assessment of rock excavation around Dalnaspidal Junction, the anticipated main rock cutting area, has indicated that 'ripping' to 'blasting' may be required. It should be noted that the close proximity of the existing A9 would restrict the use of blasting, although it may not be prohibited.

Drainage networks

3.2.29 The road surface drainage network for the Proposed Scheme typically 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.

3.2.30 Constructing SuDS basins will require excavation, potential fill and compaction to create a suitable surface. Construction of the SuDS basins and the outfall channels should be programmed to occur early in the construction process, to allow basin landscaping to become established. Before runoff is allowed to flow through vegetated SuDS, they should be fully established by planting or temporary erosion protection installed to prevent erosion of the sides and base, or the clogging of downstream components.

Road pavement laying

3.2.31 The Proposed Scheme design assumes that a low noise running surface (LNRS) will be laid in accordance with relevant specifications and guidance.

3.2.32 Following an assessment of California Bearing Ratios (CBR) values based on available Ground Investigation data, compared to the predicted design CBR (5%) and guidance given in IAN 73/06 *Design Guidance for Road Pavement Foundations,* two foundation design options have been assumed for this Proposed Scheme. The first assumes a 320mm layer of sub-base only to be adopted for any part of carriageway to be constructed over the existing A9; the second assumes a 240mm layer of subbase to be laid on 210mm of capping and this is to be adopted for the proposed new carriageway.

3.2.33 A 30mm thick LNRS surface course together with a 70mm thick binder course layer have been adopted throughout the Proposed Scheme. The total flexible asphalt thickness achieved is 320mm. This pavement construction has also been adopted for the proposed crossovers locations. It can be assumed that the road pavement will be built up in layers with the sub-base placed on top of a capping layer, followed if required by base and binder and finally the running surface. This will involve the transport of suitable material to the site.

Central reserve works

3.2.34 The only particular temporary works required through the central reserve are from ch. 7,100 to ch. 7,700. In this location, the Proposed Scheme vertical alignment is more than 2m above the existing A9, forming part of the Balsporran/ Drumochter locally grade separated access. The Proposed Scheme at this location is online widening to the west, and to construct the northbound carriageway the central reserve through these chainages will require either temporary retaining structures or reinforced soil during construction. When the new northbound carriageway is complete, traffic can be transferred and the southbound carriageway constructed above the existing A9. The temporary retaining structure would then be removed if possible.

Road markings and signage installation

3.2.35 The Proposed Scheme will require normal signage and road marking in accordance with the Traffic Signs Manual, The Traffic Signs Regulations & General Directions (2016) and Local Transport Note 1/94 *"The Design and Use of Directional Informatory Signs".* This will include directional signs, route confirmatory signs and some tourist signage. The installation of signage will require foundation excavation, concrete pour to set the signage posts and erection of the signs themselves, which will need to be delivered to the site by lorry. Road markings will be undertaken by standard road marking vehicles, prior to the carriageway under construction being re-opened to traffic.

Structures demolition and construction

3.2.36 Of the existing mainline bridge structures, all but one are proposed to be replaced with a new structure as part of the dualling works. The Allt Coire Mhic-sith crossing is the only one which is to be retained, however it is proposed to be modified. The existing Allt Coire Bhotie crossing is formed by a pair of pipe culverts. It is proposed that these are replaced with a single bridge structure. Two new structures are required as part of the Dualling works. These both take the form of an underpass for the proposed local grade separated junctions at Dalnaspidal and at Balsporran/ Drumochter.

3.2.37 Structures 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. For new structures one side will be constructed before the other side. Where there are existing structures, the new structure will be constructed in two halves with demolition of the old structure taking place either between construction of each half or after both are constructed. This includes bridge abutments, bridge structures and decks.

3.2.38 This method of phasing construction will require some form of temporary support at the structure during construction such as temporary retaining walls or soil nailing which can be removed or left in-situ once the second half of the structure is complete. The following text describes construction of a typical structure using structure S3, All't A'Chaorainn Underbridge, at ch. 3,000 as an example.

S3 All't A'Chaorainn Underbridge Ch. 3, 000

3.2.39 Structure S3 All't A'Chaorainn Underbridge is proposed as a single span portal structure. The proposed construction phasing would see the construction of the northbound carriageway with traffic running on the existing A9. Demolition of the western half of the existing structure would then be undertaken. This is shown in **Figure 2**.

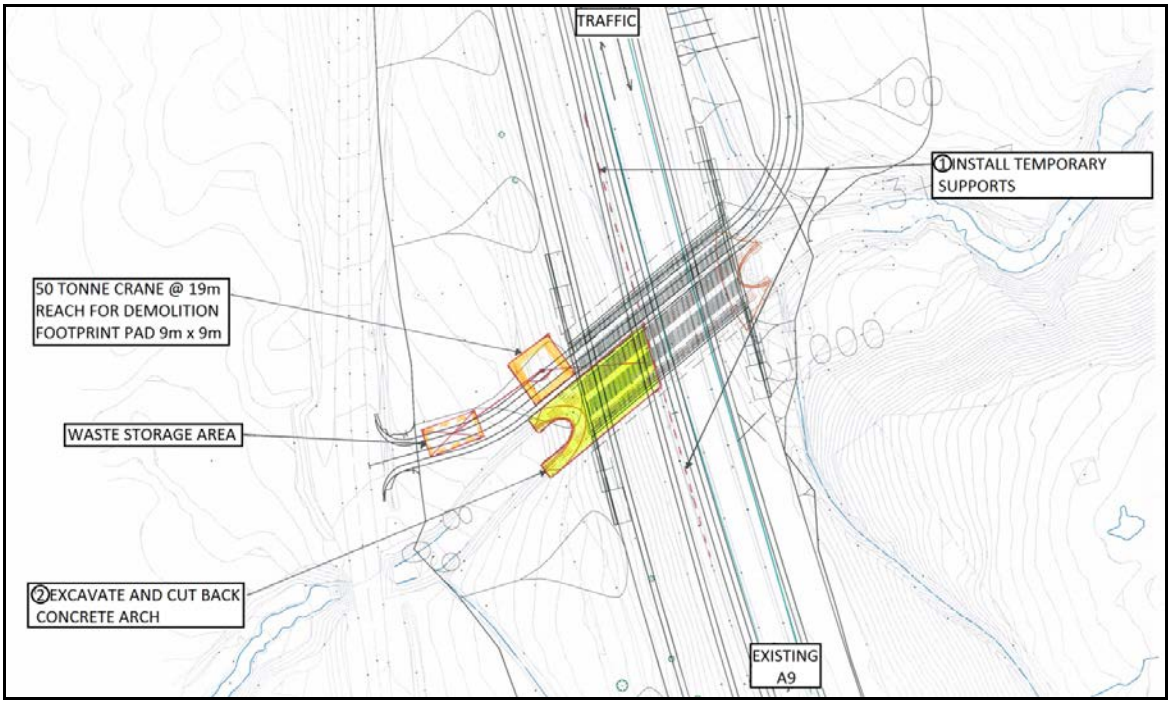

Figure 2: Phase 1 of All't A'Chaorainn Underbridge

3.2.40 A crane situated on the new northbound carriageway would be used to place the western half of the structure and the northbound carriageway would then be completed and opened to traffic.

Temporary supports would be required along the eastern edge of the new structure to provide support during construction of the remaining structure. See **Figure 3.**

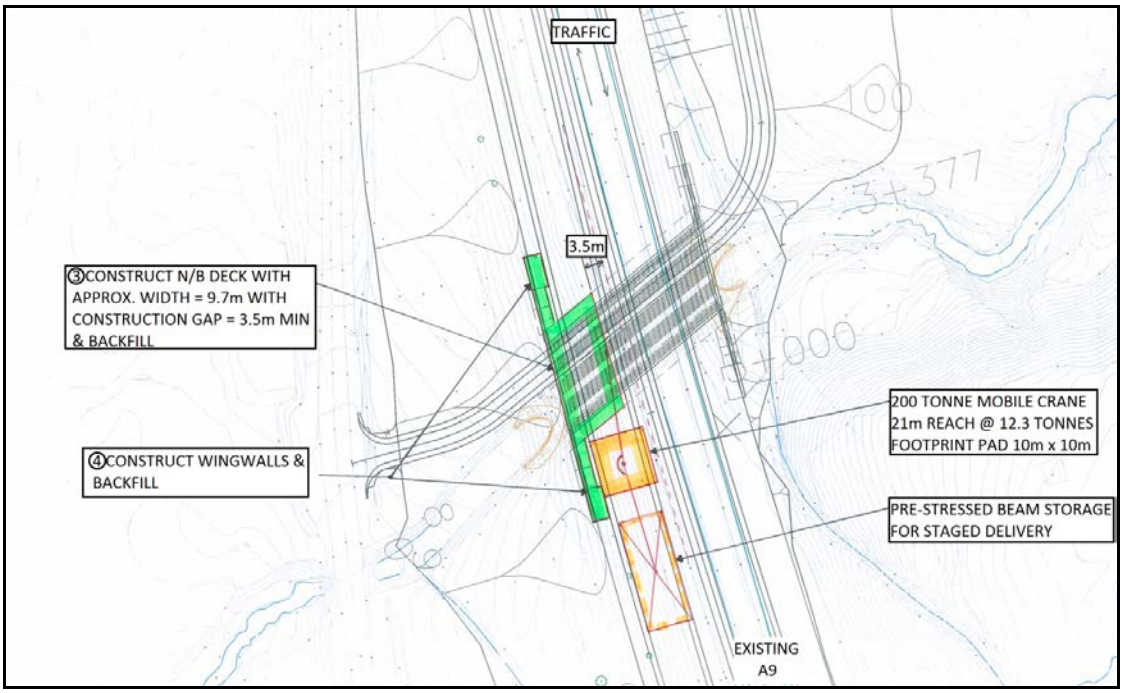

Figure 3: Phase 2 of S3 All't A'Chaorainn Underbridge

3.2.41 Once the northbound carriageway is complete traffic can be transferred from the existing A9 to the new carriageway, permitting a crane to be situated on the existing A9 to perform the demolition and removal of the remaining eastern half of the existing structure, as shown in **Figure 4**.

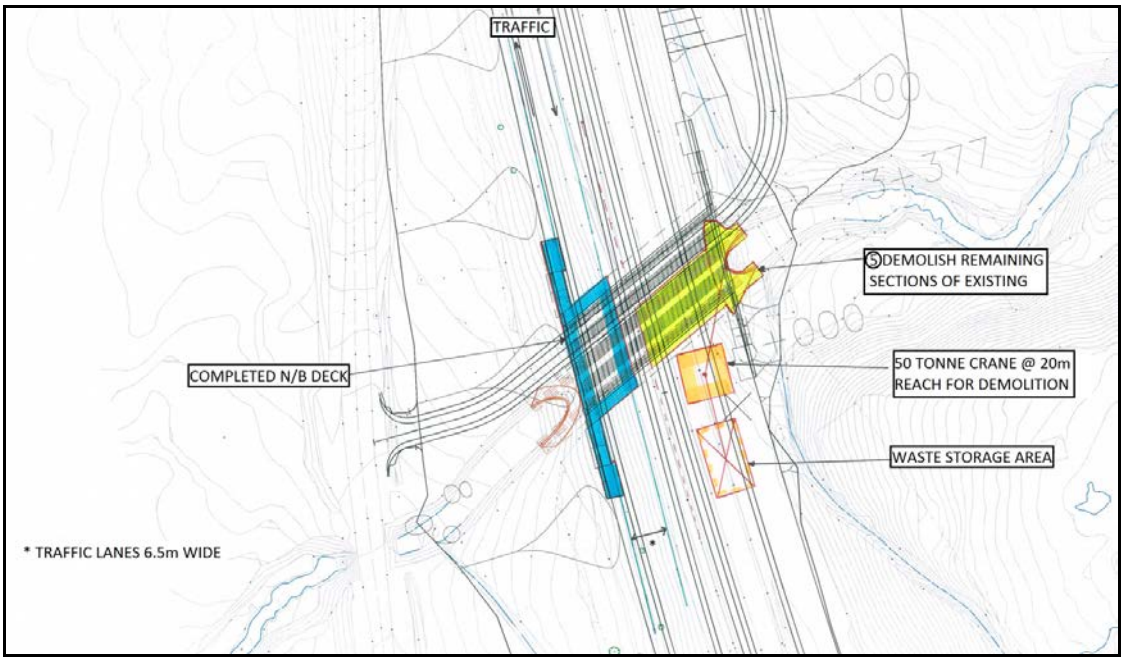

Figure 4: Phase 3 of S3 All't A'Chaorainn Underbridge

3.2.42 The crane can then be used to place the eastern half of the new structure and the southbound carriageway construction completed. Temporary supports between the two halves of the new structure would be removed prior to opening both carriageways to traffic. This is shown in **Figure 5.**

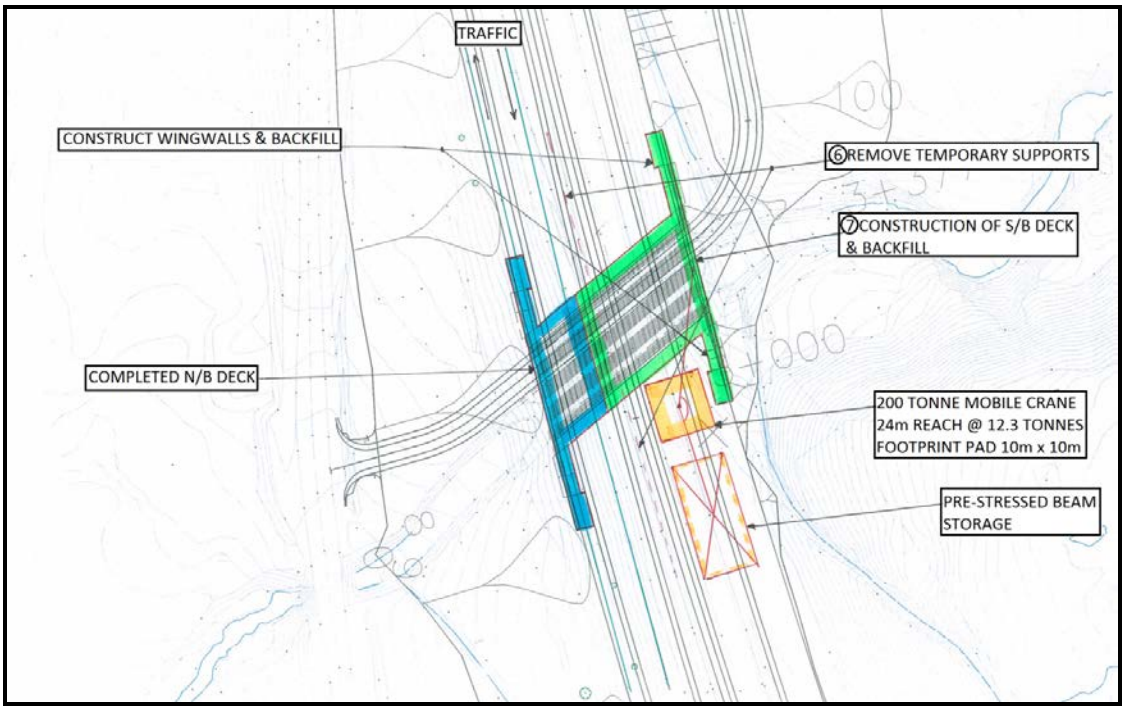

Figure 5: Phase 4 of S3 All't A'Chaorainn Underbridge

3.2.43 The temporary supports could be either sheet piling or reinforced earth techniques such as soil nailing. 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 and culverts

3.2.44 These will take place in stages depending on the road construction arrangement and whether there is an on-line or off-line watercourse alignment. Construction sequencing options are included in **Figures 6 to 13**. When referring to the watercourse construction sequencing schematics the following key has been adopted:

- Red defines works being undertaken during that stage
- Cyan denotes existing culvert and watercourse
- Blue shows the final proposed design (culverts and diversions)
- Solid lines show the permanent works
- Dashed lines show temporary works
- Traffic flow is identified by the yellow arrows

3.2.45 From ch. 2,450 to 2,750, the Proposed Scheme includes for the existing road corridor to be widened to the east in a cutting and to the west on a reinforced earth structure. To avoid culverts penetrating the reinforced earth structure, three existing crossings of the mainline (Hydro IDs 17,18 and 20) have been removed from the DMRB3 proposals with a new watercourse

channel constructed along the southbound verge to divert the watercourses to a new crossing of the mainline at ch. 2,760 (Hydro ID 21).

3.2.46 It is envisaged that the crossings for Hydro IDs 21 (ch. 2,760) and 22 (ch. 2,850) will be constructed first, prior to construction of the new watercourse channel along the southbound verge, to enable the crossings of Hydro IDs 17, 18 and 20 to be removed. As both the proposed crossings of Hydro IDs 21 and 22 are on-line, it is envisaged that temporary diversion of the traffic flow will be required to enable construction to proceed. Once water flow is diverted to the new crossing, the carriageway can be widened to the west with the reinforced earth structure constructed. The suggested sequence for the installation of the two watercourse crossings and removal of the existing crossings is shown in **Figure 12**.

3.2.47 The DMRB Stage 3 proposals also include for the installation of three new crossings under the mainline at ch. 4,120 (Hydro ID 35a), 4,775 (Hydro ID 41a) and 4,855). The works involve widening the existing road corridor to the east in a cutting and to the west on embankment. As widening to the east involves the infilling of the existing watercourse channels, it is envisaged that the road will be widened to the west initially to enable the construction of the downstream end of the culvert and the excavation of a new channel to the receiving watercourse prior to widening to the east with the existing channels diverted in to the new crossings. The suggested sequence for the installation of the new watercourse crossings is shown in **Figure 13**.)

3.2.48 Through the Drumochter Pass from ch. 5,200 to 6,130, a new watercourse diversion channel is to be constructed along the southbound verge conveying hillside runoff to the crossing of mainline at ch. 6,130 (Hydro ID 43). The verge has been widened to incorporate the watercourse diversion channel along with the road filter drain, communication ducts and vehicle restraint system. The verge width is further constrained due to the Beauly to Denny Powerline, located to the east of the proposed A9, and the requirement to construct retaining walls along the verge edge to prevent encroachment onto the pylon foundation bases. The proposed watercourse diversion channel replaces a similar existing channel along the A9 constructed in the 1970s.

3.2.49 In addition to the above specific sections, all on-line watercourse crossings to be installed (**Figures 7, 9 and 10**) will require careful management on site by the Contractor and sacrificial drainage will likely be required to enable watercourses to be temporarily diverted to enable to permanent crossings to be installed.

3.2.50 Works close to watercourses shall be carried out by the Contractor in accordance with SEPA requirements.

Site restoration

3.2.51 Once construction works are complete, the site will be cleared, all surplus stockpiled material will be removed and disposed of appropriately, temporary welfare cabins transported off site, and so on. The site will then be inspected prior to removing traffic management. Any areas where traffic management is required to isolate the existing carriageway or allow for site access should be installed prior to opening the carriageway to traffic.

3.2.52 The EIA assumes that all land within the temporary works boundary which has been subject to construction disturbance will be re-instated by the contractor, unless required for specific mitigation purposes as identified on **Drawings 6.1 - 6.7** (**Volume 3**). As shown on these drawings, ecological and landscape mitigation works will be undertaken as and where required to mitigate for the impacts of the Proposed Scheme, and ensure that the predicted residual impacts are achieved.

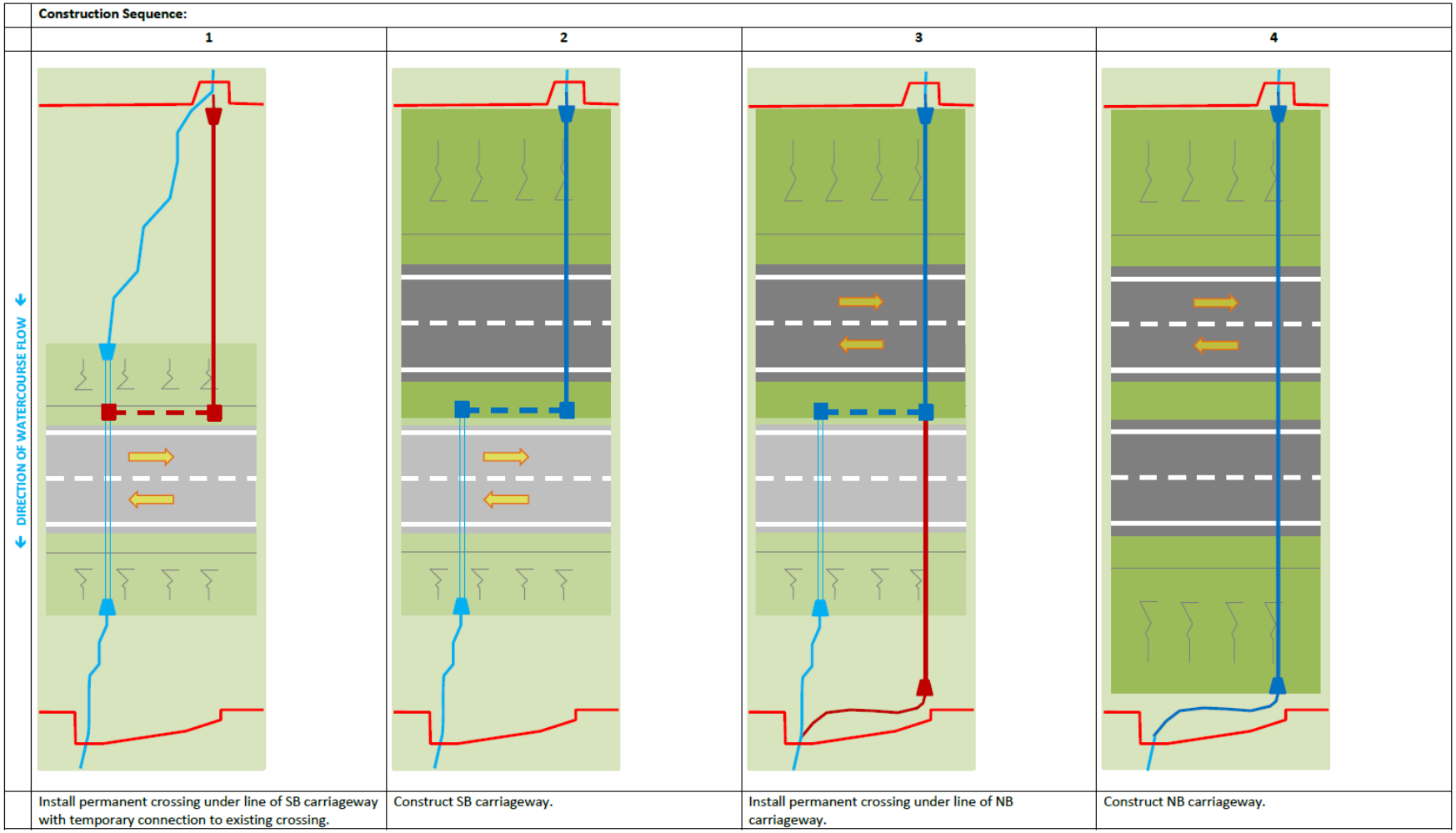

Figure 6: Widening to the east – road on embankment – off-line watercourse alignment

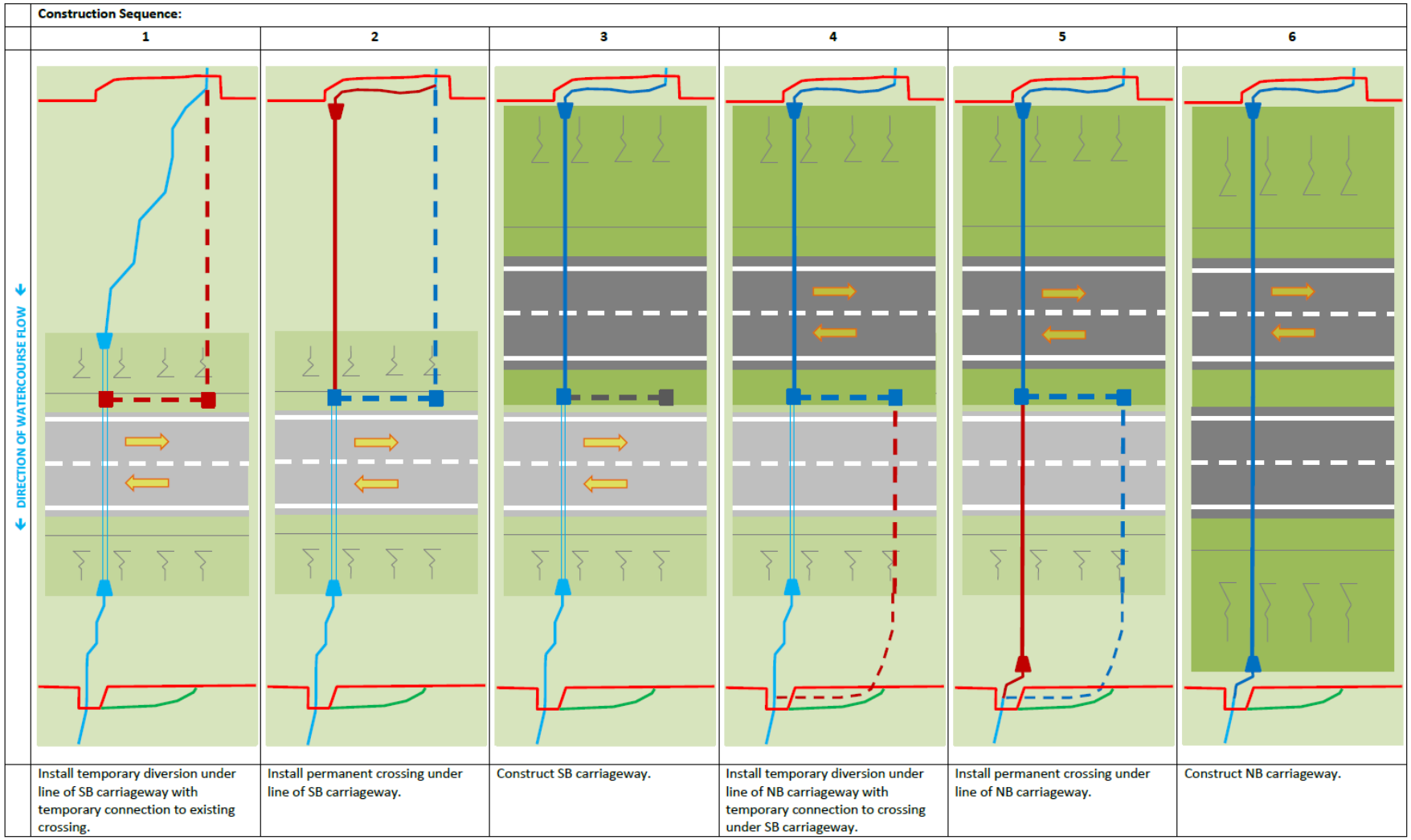

Figure 7: Widening to the east – road on embankment – on-line watercourse alignment

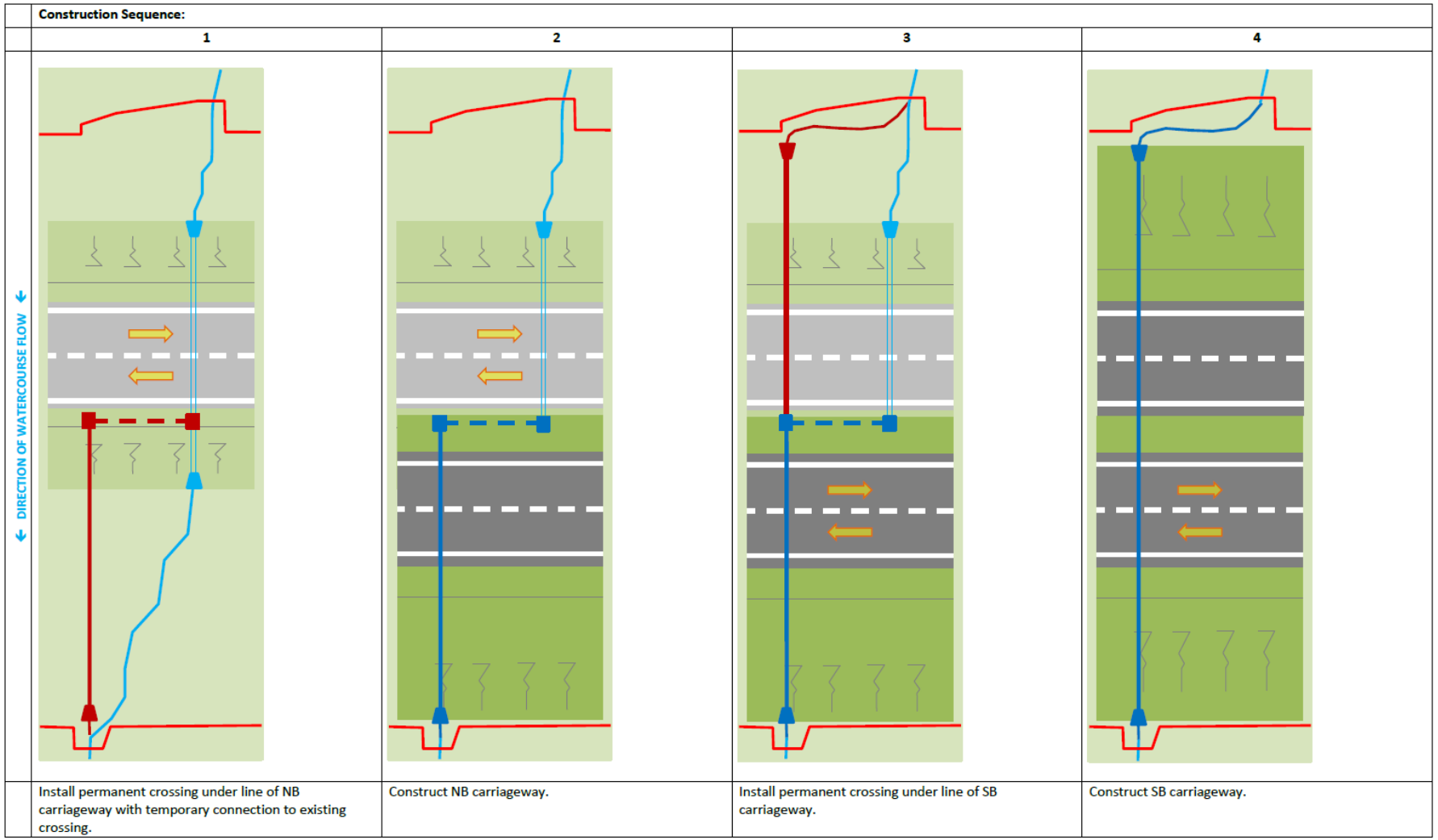

Figure 8: Widening to the west – road on embankment – off-line watercourse alignment

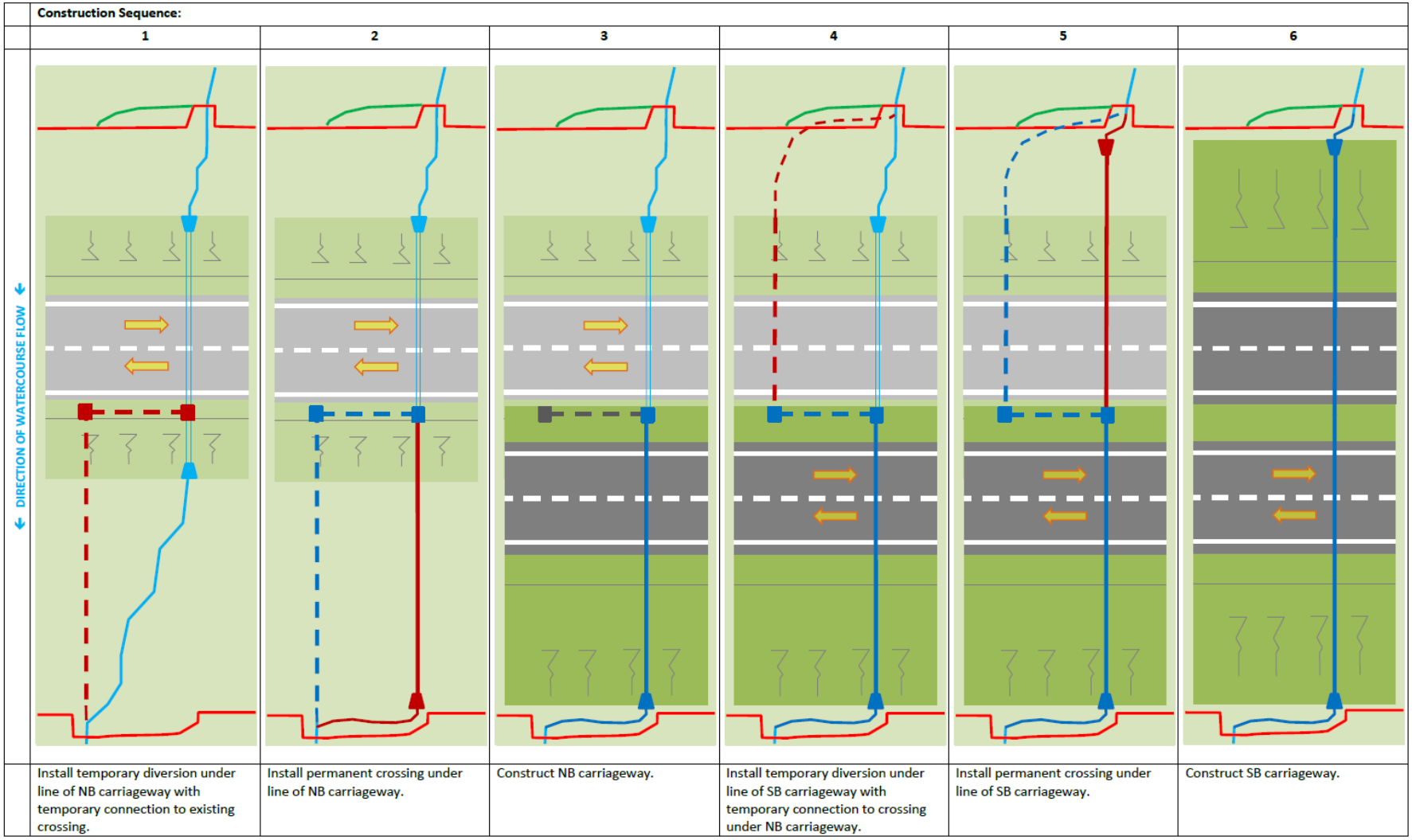

Figure 9: Widening to the west – road on embankment – on-line watercourse alignment

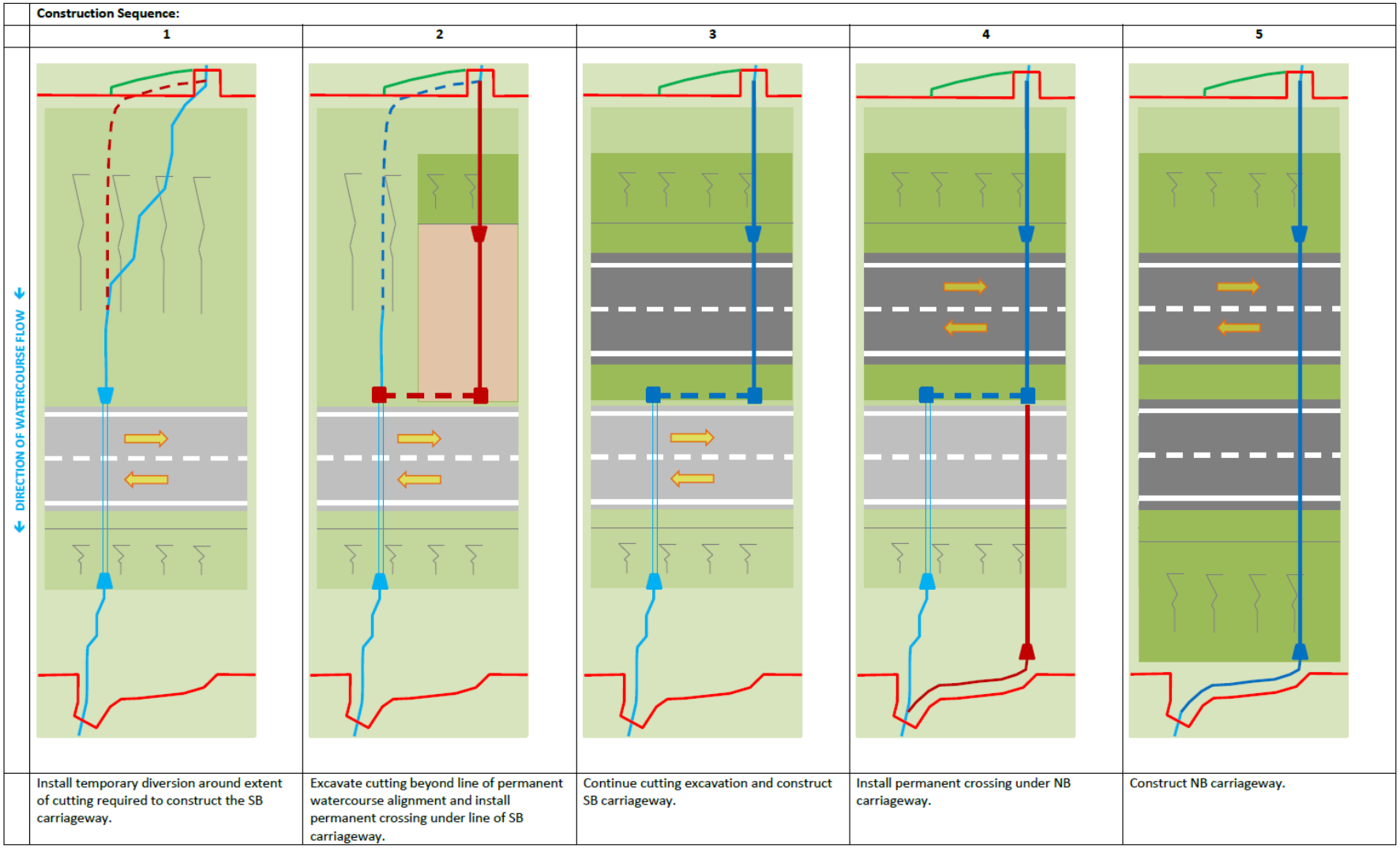

Figure 10: Widening to the east – road in cutting – off-line watercourse alignment

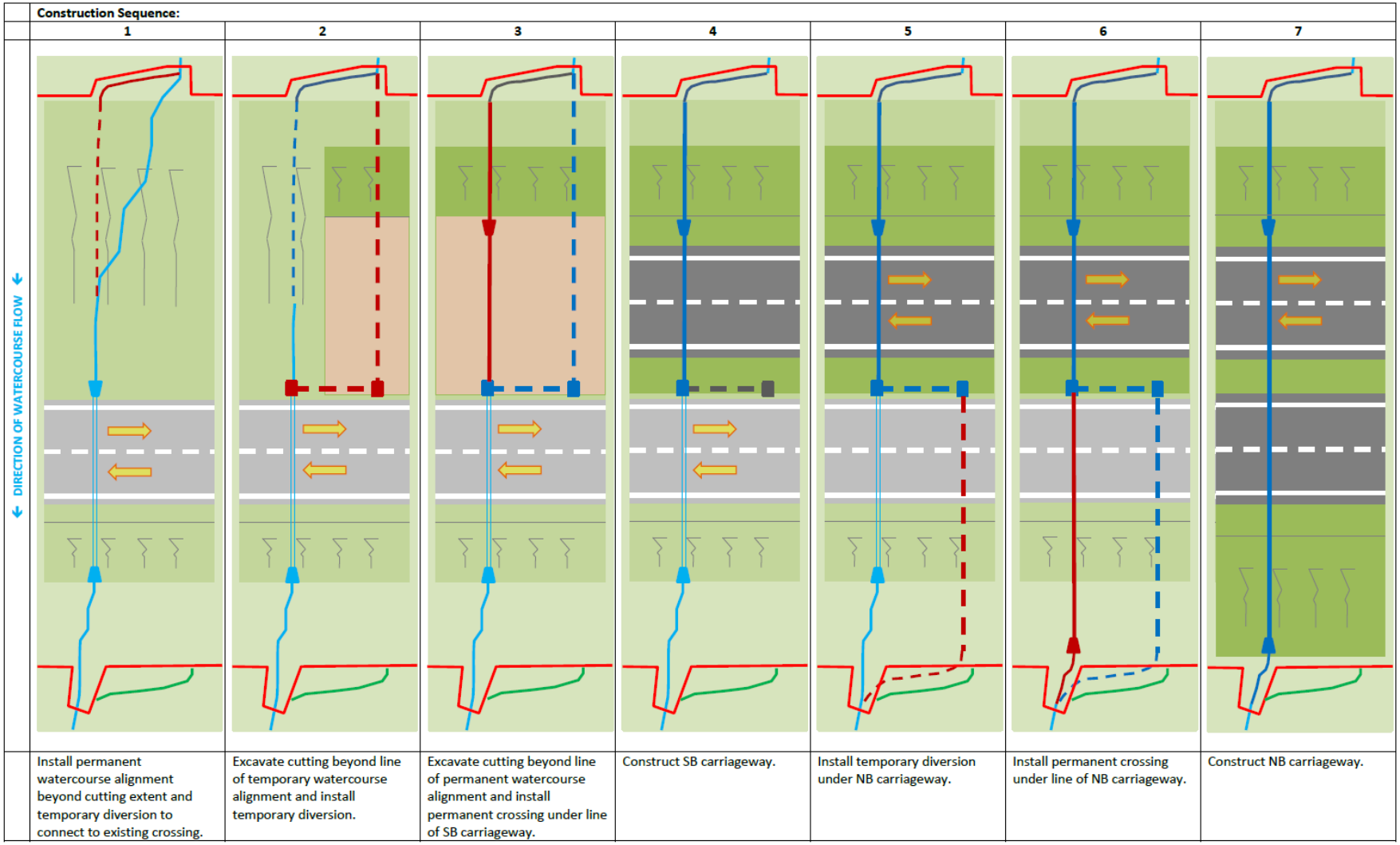

Figure 11: Widening to the east – road in cutting – on-line watercourse alignment

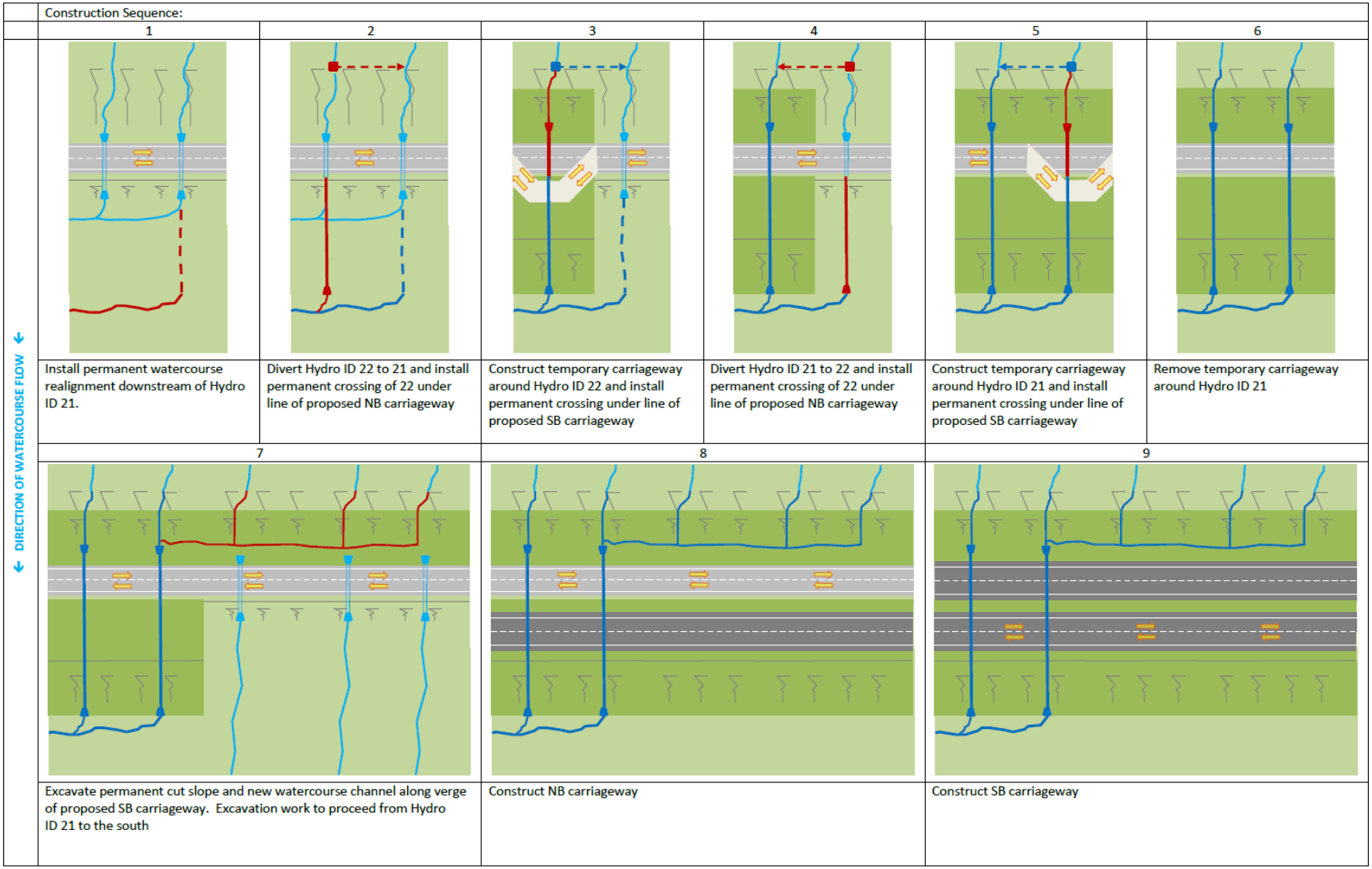

Figure 12: On-line watercourse alignment – widening to the east (road in cutting) and widening to the west (road on embankment)

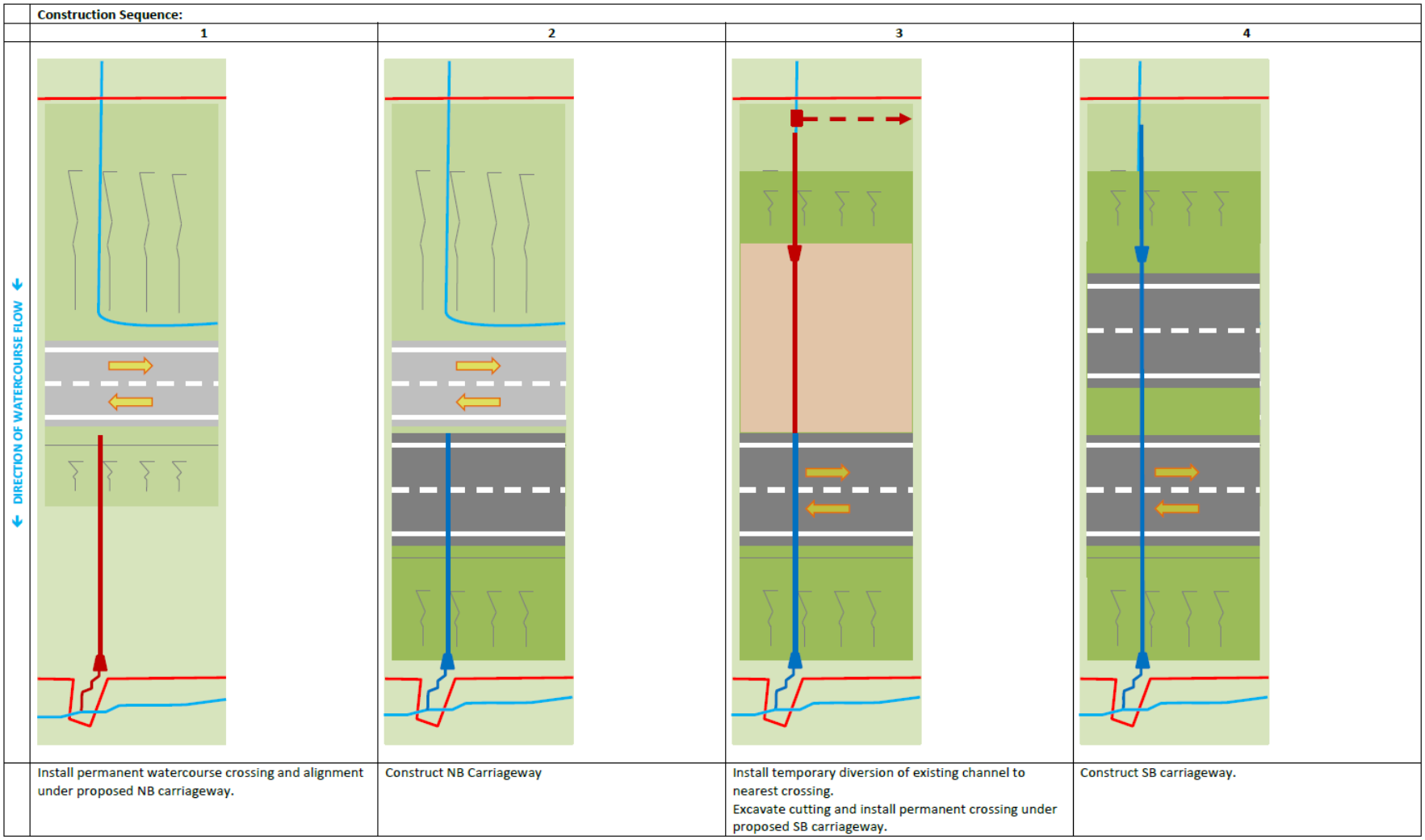

Figure 13: New watercourse crossing – widening to the east (road in cutting) and widening to the west (road in embankment)

Active traffic management

3.2.53 To minimise the impact on the many constraints within the Proposed Scheme extents, transitions from widening to the east to widening to the west are required. As such, a number of traffic management transitions will be required to keep A9 traffic flowing on the existing carriageway during the first phases of construction.

3.2.54 At the Dalnaspidal junction, it is envisaged that the southbound left in/out and underpass will be constructed first, with the southbound mainline. The underpass will enable separation of construction traffic for the remainder of the junction and northbound carriageway, in addition to providing access to Dalnaspidal during construction of the left in/out.

3.2.55 Other temporary traffic management measures may be required, including:

- works access/ egress points throughout the Proposed Scheme extents
- temporary deceleration lanes to slow traffic in proximity to active works areas
- potential need for temporary roundabouts, to facilitate plant crossings or earthworks haulage from one side to the other to access general fill and landscape fill stockpiles

3.2.56 It is envisaged that the principal construction and traffic management phases will include:

Dalnaspidal

- Construction of southbound drainage networks, culverts, structures and carriageway, and construction of Dalnaspidal junction underpass and southbound slips, with traffic flow on existing A9. Carriageway width and speed restrictions likely to be introduced
- Traffic diverted onto new southbound carriageway to allow construction of new northbound carriageway and northbound section of Dalnaspidal underpass

Drumochter Pass

- At the central section through Drumochter Pass the closure of the NMU route and construction of a temporary road along this alignment is envisaged. Carriageway width and speed restrictions are likely to be introduced
- Traffic diverted onto temporary road to the west of the existing A9 to allow construction of piled retaining walls and new raised southbound carriageway and drainage network.
- Traffic diverted onto new southbound carriageway to allow construction of new northbound carriageway, drainage network, retaining wall and NMU route

Balsporran/ Drumochter

- The north section would initially see construction of the northbound drainage networks, culverts, structures and carriageway, and construction of Balsporran access underpass and northbound left in/out.
- Traffic would then be diverted to the new northbound carriageway to allow construction of the southbound drainage networks, culverts, structures, carriageway, and construction of the southbound half of the Balsporran underpass and Drumochter Lodge left in/out.
- Offline works including downstream SuDS features, outfalls and access tracks will not necessarily affect traffic management beyond the above descriptions

- Following completion of new carriageways, traffic will be transferred, enabling works to progress on the existing A9 carriageway. This could potentially happen in localised phases, as new structures are completed to enable works to the existing structures
- In certain locations, works may be restricted or even excluded during particularly sensitive ecological periods, e.g. salmon spawning, breeding bird seasons.

3.3 Access

Temporary access tracks

3.3.2 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.

Access to property and NMU routes

3.3.3 Access to property and NMU routes shall be provided by the Contractor during construction, although alternative access routes may need to be used during construction. Left in/ left out arrangements will be developed to avoid access routes crossing the site. Key issues that will be addressed during the construction of the Proposed Scheme include:

- Existing access to Dalnaspidal would be maintained during construction of the new junction, although an alternative, temporary access to the hillside to the east would be provided for the duration of construction works in this location
- The NMU cycle route on NCN7 will be closed for significant periods during the works with contractors providing temporary alternatives or a pick up/ drop off facility
- Existing accesses to Balsporran and Drumochter Lodge would be maintained during construction of the new junction