

## 4 Scheme Description

### 4.1 Introduction

- 4.1.1 This chapter describes the key components and activities associated with the Proposed Scheme. These comprise the carriageway, junctions, side roads, structures, drainage, lighting, landscape proposals, land take, environmental measures and anticipated construction operations.
- 4.1.2 The assessment of impacts, the prediction of environmental effects and the proposed mitigation measures are based on the preliminary specimen design of the scheme as described in the following sections. It is possible that potential design, operational and management modifications to the preliminary design could be identified which benefit the integration, operation, environmental implications and economics of the proposal during detailed design. Any proposed modifications would be subject to approval by Transport Scotland. Subject to approval to proceed, Transport Scotland, as promoters of the Proposed Scheme, would ensure that those responsible for detailed design would be required to demonstrate that such modifications would not detrimentally change the significance of the impacts described in this Environmental Statement.

### 4.2 Principal Design Components

- 4.2.1 The Proposed Scheme would involve the construction of approximately 3.8km of wide single carriageway incorporating lengths of overtaking lane from a proposed roundabout on the existing A737, located between the Wilson car auction site junction and the A737 bridge over the Caaf Water, to a proposed tie in to the existing single carriageway A737 approximately 500m northeast of Birkentop Cottage.
- 4.2.2 There would be one intermediate junction in the form of a roundabout where the bypass would intersect with the B707. The bypass would be bridged over by one existing local road (Blair Road). Sections of three roads would be stopped up in the Highfield area: Auchengree Road the B707 and the existing A737.
- 4.2.3 An approximately 280m long four-span viaduct (3 sets of double piers) structure would carry the alignment over the River Garnock, including its historical floodplain, and the Glasgow to Ayr rail line.
- 4.2.4 A cattle underpass at the northern end of the scheme alignment and a cattle pass on the Blair Road bridge would provide continued farm access for selected holdings that would be severed. Culverts would be provided where watercourses would be crossed by the bypass.
- 4.2.5 Lighting would be provided at the two new roundabouts and the sections of approach road leading into them.
- 4.2.6 The scheme general layout is shown in Figures 4.1a to 4.1e and typical cross sections in Figure 4.2. Indicative structure designs are shown in Figures 4.3 and 4.4. Principal drainage outfalls are shown in Figures 16.3a and 16.3b. Landscape proposals and environmental mitigation are shown in Figures 9.36a to 9.36e.

## **4.3 Traffic Forecasts**

- 4.3.1 Traffic congestion and subsequent queuing on the A737 through Dalry was measured in traffic surveys undertaken during the STAG Appraisal<sup>1</sup>. These surveys confirmed that southbound delays during peak hour traffic are experienced on a regular basis. The surveys also showed that northbound delays were insignificant. The primary cause of the congestion along the A737 in Dalry is delay experienced at the Townhead Street/New Street Junction. This is exacerbated by both inappropriate and illegal parking in the vicinity of this junction.
- 4.3.2 In addition, congestion and delays result from bridge strikes on the existing railway overbridge (which has restricted vehicle height clearance) that carries the Glasgow to Ayr railway line and by high sided vehicles missing the diversion route and performing a U-turn to avoid the height restricted bridge.
- 4.3.3 Traffic congestion occurs within the Town Centre most notably along New Street from Dalry Cross to the traffic lights at Townend Street. The key issues in relation to this congestion are:
- The high volume of traffic using North Street/New Street within the town.
  - Delays at traffic lights for right turning traffic from Dalry Cross, conflicting with the demand on the A737.
  - Illegal/inappropriate parking and conflicting needs for car parking and shop deliveries.

## **4.4 Bypass Alignment**

- 4.4.1 A roundabout is proposed on the existing A737 in the vicinity of Hillend Farm, south of Dalry (between the auction site junction and the A737 bridge over the Caaf Water), to tie the proposed bypass into the existing local road network. The northern and southern arm of the roundabout would require minor realignment works to tie the Proposed Scheme into the existing A737.
- 4.4.2 The bypass from the roundabout follows a westerly direction initially on embankment until crossing the River Garnock and the Glasgow to Ayr Railway line on a viaduct (approximately 280m in length). The bypass continues on an embankment (approximately 9m in height) gradually changing to a north-easterly direction. On the approach to Blair Road, the bypass is below the existing ground level, in cutting (maximum depth of approximately 11m), allowing Blair Road to remain open via an overbridge between Stoopshill Farm to the south-east and Blairland Estate to the north-west. This section of the bypass would have a Wide Standard (WS) 2+1 layout with provision of a northbound overtaking lane for approximately 1.3km. As indicated in the photograph below, WS 2+1 involves the presence of two lanes in one direction allowing dedicated overtaking, while traffic travelling in the opposite direction is restrained from overtaking (as identified by the characteristic red-painted central area).

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<sup>1</sup> A737 STAG Appraisal Report, March 2006. Mouchel Parkman.



*Photograph 1: Example of  
WS 2+1 layout*

- 4.4.3 The bypass continues in a north-easterly direction through Peesweep Mount in cutting along the majority of its length (between approximate depths of between 1 to 5.5m depth) to a second proposed roundabout located at the current junctions between the B707, C93 and Aughengree Road. This section of the bypass would have a WS 2+1 layout with provision of a southbound overtaking lane for approximately 0.8km.
- 4.4.4 The A737 Beith Road would be realigned from the approximate location of Coalheughglen to the south of the cluster of dwellings at Highfield to form the northwest roundabout arm and provide an opportunity for traffic to travel to Dalry. Aughengree Road would be realigned from the north of the dwellings at Highfield to form a new T-junction with Beith Road. The C93 would form the southeast roundabout arm with minor realignment works. The B707 would be realigned from the vicinity of Highfield Farm to form a new junction with C93, east of the bypass and would be stopped up to the west of the bypass at Coalheughglen. Minor improvement works associated with the above realignment works are also proposed to ensure the local road network remains viable with particular regard to access for the dwellings around Highfield.
- 4.4.5 From the proposed roundabout the bypass continues for approximately 1.3km in a north-easterly direction (at approximately existing ground level) before tying into the existing A737 west of the Hareshaw Farm access road. The cross section would be a single lane carriageway with the exception of provision of a Differential Acceleration Lane of approximately 250m in length, which would provide further overtaking opportunities for northbound traffic on the exit of the proposed roundabout at Highfield.

## **4.5 Junctions**

- 4.5.1 The southern roundabout is situated online and accommodates 3 arms linking the A737 to the proposed bypass. The roundabout incorporates a crossing facility connecting the existing footpath over the new bypass. The northern roundabout sits over the intersection of the A737 Beith Road, the B707 and the C93. It accommodates 4 arms which link the proposed bypass to the A737, C93 which facilitates a link from the C93 to the B707 and from the A737 to Auchengree Road. The roundabout incorporates a crossing facility connecting the existing NCN Route 7 over the new bypass.

## 4.6 Local Roads

Table 4.1 Local Roads Speed Limits

Local Road Name	Existing Speed Limit
A737 Beith Road	60mph (National Speed Limit)
A737	60mph (National Speed Limit)
B707	60mph (National Speed Limit)
Blair Road	30mph to 60mph (National Speed Limit)
Auchengree Road	60mph (National Speed Limit)
C93	60mph (National Speed Limit)

- 4.6.1 The all purpose roads have a design speed of 100kph except for A737 Beith Road tying into the west of the northern roundabout with has a design speed of 70kph because of the curvature of the existing road and narrow verges.
- 4.6.2 The Proposed Scheme comprises sections of new construction and sections of existing network, as described below.

### Southern Roundabout

#### Southern Roundabout – A737 Southern Approach

- 4.6.3 Minor realignment works are required to the existing A737 on the southern approach to the southern roundabout. This extends over approximately 220m from the private access leading to the Wilson car auction to the proposed roundabout. The horizontal alignment remains similar to the current layout with minor changes to the lane widths to accommodate the roundabout geometry. The vertical alignment follows the existing road profile as far as practical, with a maximum level difference of 0.2m.

#### Southern Roundabout – A737 Northern Approach

- 4.6.4 Minor realignment works are also required to the existing A737 on the northern approach to the southern roundabout. This extends over approximately 165m from approximately 80m south of the existing Caaf Water bridge to the proposed roundabout. The horizontal alignment remains similar to the current layout with minor changes to the lane widths to accommodate the roundabout geometry. The design of the vertical alignment follows the existing road profile as far as practical, with a maximum level difference of 0.7m.

### Northern Roundabout - A737 Beith Road Tie-in

- 4.6.5 The A737 Beith Road would be realigned from the approximate location of Coalheughglen, to the south of the properties at Highfield to form the northwest roundabout arm. The vertical alignment generally follows a steep upward gradient above existing ground level for approximately the first 200m until the approach to the roundabout where the alignment is then in cutting; finishing approximately 2.9m below the existing ground level.

### **Auchengree Road Link**

- 4.6.6 Aughengree Road would be severed by the proposed northern roundabout. To the north of the roundabout, the road would be realigned from the north of the dwellings at Highfield to form a new T-junction with the existing A737 Beith Road approximately 100m from the northern roundabout. From the new T-junction for approximately 130m the vertical alignment follows a gentle upward gradient with a maximum of approximately 3.6m above the existing ground level, after which it follows the existing road profile as far as practical with a maximum level difference of approximately 0.2m.
- 4.6.7 To the south, the road would be stopped up adjacent to the proposed northern roundabout. Due to the realignment works, a short connecting link with T-junctions from the Aughengree Road would be provided to maintain access to the dwellings and the NCN Route 7 at Highfield.

### **Northern Roundabout - C93 Tie-in**

- 4.6.8 The C93 would form the southeast roundabout arm with minor realignment works. The horizontal alignment remains similar to the current layout with minor changes to the lane widths to accommodate the roundabout geometry. The design of the vertical alignment is generally below the existing road profile, with a maximum level difference of 5.4m in order to tie into the proposed roundabout levels.

### **B707 Link**

- 4.6.9 The B707 would be severed by the proposed northern roundabout. To the east of the junction, it would be realigned from the vicinity of Highfield Farm to form a new T-junction with C93, approximately 100m from the northern roundabout. The vertical alignment is generally a gentle downward gradient following the existing road profile where it remains online. The approach to the new junction (over approximately 70m) continues this gradient with a maximum level difference of 4.2m below existing ground level where it ties into the road level of C93.
- 4.6.10 The B707 would be stopped up to the west of the bypass at Coalheughglen forming a 'cul-de-sac' which subject to agreement may be proposed as a private access for the landowner.

### **Blair Road**

- 4.6.11 Blair Road would remain open via a bridge over the bypass alignment. The horizontal alignment has not changed and would remain on the current straight alignment as it currently does. The vertical alignment would be largely unchanged following a general upward gradient from west to east.
- 4.6.12 The existing traffic calming features would be removed from their current location and replaced further to the east, in order to remove the conflict with a proposed access road.

## **4.7 Structures**

- 4.7.1 Two principal structures are required to be constructed as part of the Proposed Scheme. The location of each principal structure associated with the proposed route is illustrated on Figures 4.1a to 4.1e and they are described below.



### **Blair Road Overbridge**

- 4.7.2 This structure is required to carry the existing Blair Road over the proposed A737. At this location the new road would be located in a deep cutting some 7m to 8m deep which has an elevated position on the existing hillside. Consequently the new bridge would present a prominent feature to drivers travelling along the route and would be able to be viewed from a considerable distance. In addition to carrying the road the structure would be widened on its north side to provide a dedicated 2m wide cattle pass.
- 4.7.3 The contract would be procured on a "Design and Build" basis so that the contractor would be free to develop his preferred form of structure. The Employers Requirements however would be worded to ensure that an open aspect structure of suitable aesthetic quality would be provided.
- 4.7.4 The final form of structure envisaged is either a three span deck with intermediate piers located at the back of road verges and small height bank seat abutments or a single span deck of around 32m clear, again with restricted small height abutments set towards the top of the cutting slope. The deck construction is likely to be either concrete or steel beams with a composite deck slab. Figure 4.3 shows the location and an indicative general arrangement of the structure.

### **River Garnock Viaduct**

- 4.7.5 The viaduct structure is required to carry the proposed A737 across the River Garnock and its historic flood plain and, at its eastern end, over the existing Glasgow to Ayr rail line. The principal constraints are:
- To avoid pier supports and construction works within the river.
  - Minimum encroachment and disturbance within the flood plain.
  - To provide a simple uncomplicated structure with an open aspect of suitable aesthetic quality.
  - The rail line including Network Rail assets.
  - The two Scottish Water sewers which cross the flood plain. The exact location of these sewers has yet to be established. If possible, the new foundations would be positioned to avoid diversion of these services.
  - The site is underlain by areas of historic mine workings although these are at sufficient depth underneath the River Garnock valley to not affect the viaduct structure.
- 4.7.6 Presently these constraints have suggested a viaduct some 280m long with four spans. The abutment and associated earthworks on the western side are located out with the 1:200 year predicted flood plain. The eastern abutment and earthworks are arranged to span the railway and accommodate an access track below the east span.
- 4.7.7 A steel composite deck is proposed comprising twin box girders supported on twin circular shaft columns. The box girder arrangement presents clean lines visually and eliminates ledges and other features which can collect dirt and lead to accelerated breakdown of paint systems or accelerated corrosion. The use of weathering steel

would be considered to minimise future maintenance costs, disturbance and possible contamination of the flood plain resulting from future re-painting operations.

- 4.7.8 Safety regulations dictate that structures crossing an operational railway require to be provided with a solid 1.5m high parapet across the rail lines and their immediate approaches. In order to avoid complicated and unsightly transitions between the solid parapet a conventional post and rail system it has been decided to provide the solid parapet over the full extent of the viaduct to present a consistent appearance for both the driver and distant viewer. It is further proposed that the parapet would be formed using precast concrete units to ensure a high quality and consistent finish. Figure 4.4 shows the location and an indicative general arrangement of the structure.
- 4.7.9 As indicated earlier, although the contractor would be free to develop his preferred form of structure (under the “Design and Build” contract), the Employers Requirements would be worded to ensure that the principle constraints outlined above are accommodated within the final design.

#### **Cattle Creep Underpass**

- 4.7.10 A ‘Cattle Creep’ underpass is required to maintain agricultural access from Birkentop Farm to fields on the north western side of the proposed A737 alignment. This underpass would consist of a precast concrete box (3m height, 3m width) – and would be predominately used for cattle movements between field and farm. The location of the underpass is shown on Figure 4.1e.

### **4.8 National Cycle Network Route 7**

- 4.8.1 The Garnock Valley Cycleway runs from Irvine in the south, through Kilwinning, to the east of Dalry and north to Kilbirnie. This cycleway forms part of the National Cycle Network Route 7 and would remain accessible upon completion of the works.
- 4.8.2 The section of the cycleway which would be affected by the proposed works runs between the C93 and Aughengree Road. This is in the vicinity of the proposed northern roundabout. It is not proposed to relocate the cycleway, however works to ensure safe crossing points and safe use of the cycleway have been included in the proposed works as described below and illustrated in Figure 4.5.
- 4.8.3 This involves introduction of a cyclepath adjacent to the northbound carriageway on the C93 approximately 120m from the giveway line of the roundabout over a length of approximately 60m. A simple priority crossing (of the minor road) would be facilitated by use of road markings and tactile pavement between this and a further proposed cyclepath adjacent to the southbound carriageway which extends from the C93 around the new roundabout arm to the final section of the proposed bypass over a length of approximately 120m. The splitter island on the northbound roundabout exit would be extended for use by NMU’s wishing to cross the carriageway in this location, with particular regards to cyclist use. The cyclepath would then continue until it is parallel with the end of the island, where a priority junction would be provided across the proposed bypass. A final cyclepath of approximately 115m would be provided adjacent to the roundabout exit and northbound carriageway of the proposed bypass from the splitter island to connect with the existing Aughengree Road and through Highfield, as per the existing cycle route.

4.8.4 The existing Auchengree Road would be stopped up at the new junction location and north of the properties would be realigned to form a T-junction with Beith Road. Due to the realignment works, a short connecting link with T-junctions from the Auchengree Road would be provided to maintain access to the dwellings and the cycle route at Highfield.

4.8.5 Design of the works would be to the current version of "Cycling by Design 2010".

## **4.9 Lighting**

4.9.1 Lighting would be provided at the two new roundabouts and the sections of approach road leading into them.

4.9.2 The proposed lighting solution would reflect the design criteria of BS5489 and applicable design manuals and maintenance advice notices for motorways and trunk roads. Typically the equipment would be aluminium conical columns that do not require additional corrosion protection in the form of painting with heights of between 10 and 12m to achieve the advised level of light and uniformity across the length and width of the carriageway and at the conflict areas. The layout and spacing of the equipment is required to reflect the complexity of the carriageway layout, with alternative design criteria for conflict areas such as roundabouts.

4.9.3 Final design proposals would reflect optimum cost effective solutions including the life time maintenance costs. The introduction of innovative lighting solutions has been considered, such as varied light levels, which would reduce the electrical consumption and operating costs of the installation. The final design solutions would also reflect the environmental and aesthetic impact of the installation.

## **4.10 Traffic Signs**

4.10.1 The proposed traffic signs layout would be developed in accordance with the Traffic Signs Manual and the DMRB. The typical layout of signs would consist of advance direction signage, regulatory signage and warning signage. Sign plates would be fabricated from aluminium and would be mounted steel posts / passively safe posts as appropriate.

4.10.2 Proposed signage in the vicinity of new road lighting would be illuminated.

## **4.11 Drainage**

4.11.1 The following objectives have informed the development of the drainage strategy for the Proposed Scheme:

- prevention of flooding of the proposed bypass and ponding on the road surface;
- provision of sub-surface drainage to protect the integrity of the road pavement and subgrade material;
- prevention of erosion of cutting and embankment slopes;
- interception of boundary drains and overland flow;
- minimisation of impacts on existing floodplains; and



- control of water borne pollutants associated with carriageway run-off and accidental spillage to protect receiving watercourses and groundwater from potential contamination.

### **General Principles**

- 4.11.2 The preliminary design provides for discharge of road related run-off to existing watercourses. The Proposed Scheme incorporates a number of Sustainable Drainage Systems (SuDS) designed to achieve the required level of attenuation and treatment of road runoff. These systems include filter trenches, swales and detention basins.
- 4.11.3 The benefits gained from utilising SuDS relate to reduction of peak flows, reduction in volumes and frequency of discharge to the existing watercourses, replication of natural drainage patterns, improvements in water quality, enhanced landscape and wildlife characteristics and improved amenity.
- 4.11.4 The proposed road drainage is shown on Figures 16.3a and 16.3b.
- 4.11.5 The overall drainage strategy has been developed in accordance with CIRIA Report C697 "The SUDS Manual", 2007 and Planning Advice Note (PAN) 61 "Planning and Sustainable Urban Drainage Systems", advice on good practice and other relevant information.
- 4.11.6 A major factor in the development of the strategy has been the positive integration of safe SuDS features through the three principle objectives of SuDS; namely amenity, water quantity and water quality. Solutions developed provide suitable habitats for flora and fauna reducing flood risk and protecting the downstream watercourses from point source, diffuse and accidental contamination.
- 4.11.7 Furthermore factors associated with the runoffs from roads, such as accidental spillages from overturned heavy goods vehicles have also been incorporated into the drainage design. The outfall design would include 20m<sup>3</sup> volume of storage as recommended by DMRB. During an emergency the inlet of the proposed SuDS basins would be sealed while the surface of the road is washed and drained. The spillage would then be pumped and transported for safe disposal. Oil separators would not be incorporated into the scheme since HD33/06 of the DMRB (Volume 4 Section 2) suggests consideration should be given to a vegetated treatment system (SuDS) in this situation.
- 4.11.8 The SuDS proposals for the road drainage promotes the use of source control methods such as filter drains and swales to provide the first level of treatment. The second level of treatment would be provided through detention basins prior to discharge to the existing watercourses. The detention basins would provide attenuation for the 1 in 100yr flood event in accordance with DMRB with peak discharge rates limited to the 1 in 2 year 'greenfield' runoff.
- 4.11.9 Following discussions with North Ayrshire Council, further attenuation would be provided in the designed freeboard to accommodate the 1 in 200yr flood event. This would ensure that the basins are designed appropriately to allow for climate change. Overland flow routes would also be provided for more extreme events; allowing safe discharge of the runoff towards the receiving watercourse.

- 4.11.10 The drainage system serving the new A737 has been divided into 10 separate networks, as indicated on Figures 16.3a and 16.3b. Seven of the proposed networks discharge to the water environment via detention basins and the three remaining proposed network connect to existing road drainage systems prior to discharge to the water environment.

### **Groundwater Drainage**

- 4.11.11 Designated groundwater drainage would not be required. Groundwater seepages would be intercepted by the proposed road drainage (filter drains and filter trenches) and routed to the existing watercourses via SuDS.

### **Watercourse Diversions**

- 4.11.12 Two watercourse diversions proposed as summarised below.
- Unnamed tributary of the River Garnock (refer to Figure 4.1a and Figure 16.3a) - the proposed route alignment crosses an unnamed tributary of the River Garnock between Chainages 670 and 780m. It is proposed to divert the existing watercourse through installation of a new culvert under the mainline at chainage 780 and construction of a new open channel along the toe of the road embankment.
  - Coalheughglen Burn (refer to Figure 4.1d and Figure 16.3b) - the proposed realignment of the de-trunked A737 to the north east of Coalheughglen Farm crosses the Coalheughglen Burn. It is proposed to divert the existing watercourse through the installation of a new culvert under the realigned carriageway and construction of new open channels along the toe of the road embankment upstream and downstream of the new culvert.

### **Earthworks Drainage**

- 4.11.13 Where the road is located in cuttings, the road drainage has been designed to include surface runoff from the adjacent cutting slope.
- 4.11.14 Where adjacent land falls towards the top of the road cuttings, earthworks ditches would be designed to intercept surface runoff for discharge either to the carriageway drainage or nearest watercourse.
- 4.11.15 Where roads are constructed on embankments, earthworks ditches would intercept surface runoff from adjacent embankment slopes or land falling towards the toe of the embankment for discharge to the nearest existing watercourse.

### **New Watercourse Crossings**

- 4.11.16 Where technically viable, new culverts would be designed to convey the predicted 1 in 100yr peak flow in free flow conditions with zero afflux. A freeboard of 300mm minimum above the design water level would be provided to account for silt deposits and to enable passage of floating debris through the culvert.

- 4.11.17 Where limited headroom is available, an assessment of the potential flood risk to nearby properties and the proposed road due to culvert surcharge, has taken precedence over the stated design criteria.
- 4.11.18 To maintain the existing hydraulic conditions, the new culverts would be sited on-line and bends and changes in longitudinal slope avoided. Protection of the natural bed and banks against erosion would be achieved by placing scour protection at culverts' inlets and outlets. The inverts of all new culverts would be lined with natural bed material.
- 4.11.19 Depending on the size of the natural channel and available headroom, circular or rectangular box culverts would be considered in the design.
- 4.11.20 Each culvert would have cast in-situ reinforced concrete headwalls with trash or safety screens included where required.
- 4.11.21 The following new culverts are proposed on existing watercourses for the proposed route alignment:
- New culvert (NC1) on the unnamed tributary of the River Garnock under the A737 at mainline Chainage 780m. This culvert forms part of the watercourse diversion noted above.
  - New culvert (NC2) on the Coalheughglen Burn under the A737 at mainline Chainage 2700m.
  - New culverts (NC3) on the Coalheughglen Burn under the de-trunked A737 to the north east of Coalheughglen Farm. This culvert forms part of the watercourse diversion noted above. A mammal pass would be provided either as a separate tunnel adjacent to the new culvert or as an integral part of the culvert (i.e. mammal ledge).
  - New culvert (NC4) on the unnamed tributary of the Coalheughglen Burn under the A737 at mainline Chainage 2905m. A mammal pass would be provided either as a separate tunnel adjacent to the new culvert or as an integral part of the culvert (i.e. mammal ledge).
  - New culvert (NC5) on a land drain in the Highfield area. A short culvert beneath a field access point adjacent to the existing A737 (the road would be retained as for access).

### **Landscape Proposals and Environmental Mitigation**

- 4.11.22 The specimen scheme design has been developed taking into account the following key landscape principles:
- Consideration of how to achieve best fit with the exiting landform.
  - Retention and best use of existing vegetation.
  - Protection of nearby properties.
  - Minimising damage to other landscape elements.
  - Minimising damage to ecological and archaeological interest.

- 4.11.23 A landscaping strategy would be incorporated into the Proposed Scheme as indicated on Figures 9.36a to 9.36e and this would comprise a combination of earth mounding, seeding, tree and hedgerow planting.

## **4.12 Construction**

### **Construction Period**

- 4.12.1 Subject to approval, it is anticipated that construction would commence in 2015 and continue for an estimated 18 months, on a continuous basis.

### **Contract Programme**

- 4.12.2 The contractor would be required to provide a detailed programme prior to commencement of the works. This would set out:
- the overall programme of construction;
  - programming of the key elements and phases of construction; and
  - the duration of each element and phase.
- 4.12.3 The programme would be regularly updated to reflect any changes in programmed activities and would 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.

### **Construction Environmental Management Plan (CEMP)**

- 4.12.4 The contractor would be required to produce and maintain a Construction Environmental Management Plan (CEMP) as part of the contract for the proposed works. The CEMP would outline the proposed measures to minimise and mitigate the construction impacts of the development in accordance with the ES. The measures would address management of construction related traffic, noise and dust suppression, working margins and methods related to historic features, sensitive habitats and species and watercourses.
- 4.12.5 The Construction Site Manager would ensure that environmental considerations are included in risk assessments, method statements, work instructions and field control sheets and would ensure these are communicated to those undertaking the work. No work would commence on site before method statements and risk assessments have been approved by the appropriate person. An Environmental Manager/Clerk of Works would be responsible for co-ordinating and managing all environmental activities during the construction phase.
- 4.12.6 All activities on site would be reviewed against the requirements of the CEMP via an integrated risk assessment and method statements procedure. The contractors Site Manager would review environmental risks associated with the construction process and appropriate control measures included in method statements and field control sheets.
- 4.12.7 Regular audits would be completed to verify that the project is compliant with the established CEMP, contractual requirements and legislation.

- 4.12.8 The Environmental Manager would carry out regular assessments of the project's environmental performance.

#### **Site Waste Management Plan (SWMP)**

- 4.12.9 A Site Waste Management Plan (SWMP) would be prepared and maintained by the main-contractor constructing the scheme. The SWMP would include proposals for dealing with waste arising from construction of the scheme and would ensure that waste materials are appropriately managed and wherever possible materials re-used on-site rather than removed for disposal.

#### **Working Hours**

- 4.12.10 Normal working hours would be Monday to Saturday 0700 to 1900hr. It is likely that the contractor would 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. Such extensions beyond normal working hours would be dependent on the contractor's proposed methods of construction, and subject to negotiations and agreements with Transport Scotland and North Ayrshire Council Environmental Health Officers (EHO).

#### **Site Compounds**

- 4.12.11 The identification of site compounds and storage areas would be the responsibility of the contractor. Should the contractor wish to use land outside of the lands pursuant to the bypass scheme, the contractor would be required to obtain agreement from Transport Scotland and North Ayrshire Council and the applicable landowner. It would be a condition of approval that such submissions must demonstrate that the environmental implications of the use of such sites have been taken into account and appropriate safeguards have been incorporated into the project CEMP.

#### **Traffic Management**

- 4.12.12 The contractor would be required to develop and agree a Traffic Management Plan (TMP) with Transport Scotland and North Ayrshire Council for the duration of the contract. The plan would identify proposals for the principal phases of the works and individual construction activities which would potentially involve disruption to existing vehicular and pedestrian access in specific locations along the construction corridor.
- 4.12.13 It would be a requirement that the traffic management would comply with 'Chapter 8 - Traffic Signs Manual, as published by the Department of Transport'. It would be a further requirement that the plan stipulates measures agreed with Transport Scotland and North Ayrshire Council which would address such issues and ensure continued and safe access throughout the contract period.
- 4.12.14 Some temporary road closures may be unavoidable during construction to allow for realignments and/or bridge construction. This would only be allowed if it is agreed by Transport Scotland and North Ayrshire Council that other traffic management options are impractical.
- 4.12.15 Access to the site for construction related traffic would generally be limited to the existing roads namely the A737, Blair Road from the east and the A737 Beith Road. Haulage routes would be permitted across side roads within the site boundaries. Access would be permitted at side roads for the construction works associated with the

side roads and accesses; and any associated structural works. Similarly, access would be allowed at these locations for site workers to access the site going to / from work.

- 4.12.16 Vehicles must comply with the gross vehicle weights prescribed in the Road Traffic (Construction, Equipment and Use of Vehicles) (Amendment) Regulations 2003. The use of tracked vehicles outside of the site boundary would not be permitted without approval from Transport Scotland and adoption of adequate road protection measures.
- 4.12.17 The contractor would be responsible for any construction related damage to roads or paths in the vicinity of the works and would be responsible for carrying out repairs or reinstatement, as deemed necessary, with the approval of Transport Scotland.

### Earthworks Balance and Materials Requirements

- 4.12.18 The preliminary design includes significant sections of cutting and embankment which have been designed to minimise the impact on the surrounding topography whilst achieving the required design standards for the proposed road. Where practicable, excavated material would be deposited along the route in areas of proposed fill.
- 4.12.19 A summary of the quantities within these sections is detailed in Table 4.2 below.

Table 4.2 - Summary of Earthworks Quantities

Section	Location	Cut (m <sup>3</sup> )	Fill (m <sup>3</sup> )
M100	Mainline Chainage 0 – 2420m	239,991	218,221
M200	Southern Roundabout - A737 Southern Approach	13,093	821
M300	Southern Roundabout - A737 Northern Approach	77	3,794
M400	Northern Roundabout – A737 Beith Road tie-in	2,773	13,442
M500	Auchengree Road Link	1,423	9,352
M600	Northern Roundabout - C93 tie-in	35,840	772
M700	B707 Link	9,923	548
M800	Mainline Chainage 2440m – 3806m	13,519	58,294
M810	Access from A737 to Pasturehill Cottages	0.3	1,738
MG00	Accommodation Works – Cattle Underpass at Ch 3300m	306	213
<b>Total</b>		<b>316,945</b>	<b>307,195</b>

- 4.12.20 The bulk earthworks for the complete scheme are:

- Cut Material – 316,945m<sup>3</sup>
- Fill Material – 307,195m<sup>3</sup>
- Material Surplus – 9,750m<sup>3</sup>

- 4.12.21 A review of results from the ground investigation indicates that much of the excavated soil material would be suitable for re-use. The only exception to this is made ground encountered in two localities at the north of the route (refer to Chapter 11 for more details on the location of these). Contamination levels encountered suggest that this material would potentially be classed as Hazard (Special) Waste.



- 4.12.22 Some form of treatment e.g. lime/cement stabilisation may be required to reduce the moisture content of the weathered Glacial Till so that it is suitable for re-use as embankment fill material. The weathered Glacial Till is present in the upper 2m of material with the underlying fresh Glacial Till suitable for re-use without treatment.
- 4.12.23 Excavation of peat in the north of the site can be used in landscaping bunds and environmental enhancement. Any additional cutting material would be utilised in landscaping requirements and environmental enhancement.
- 4.12.24 Wherever possible, site derived materials for re-use in structural or landscape earthworks would be directly transferred from areas of cut to areas of fill. Should there be a requirement for temporary stockpiling of materials they would be stored in designated and appropriately 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.

#### **Protection of Topsoil**

- 4.12.25 The contractor would be required to prepare and implement a Topsoil Management Plan as part of the contract CEMP. This would address issues of stripping, handling, storage and re-spreading to ensure that impacts on soil condition and ecology would be minimised.

#### **Disposal and Import of Materials**

- 4.12.26 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 would be the responsibility of the contractor. The contractor would be required to meet all legal obligations relating to licensing and planning approvals if required.
- 4.12.27 Where such import and export of materials is required, haulage routes would be subject to agreement under the required project Traffic Management Plan. Specific consideration would be given to the potential sensitivity of communities located along potential haul routes.

#### **Contamination**

- 4.12.28 Any potentially contaminated material would be separated from other excavated material, tested and either treated, or assessed as inert, non-hazardous or hazardous and disposed of to an appropriately licensed location.

#### **Consolidation of Mine Workings**

- 4.12.29 Areas of previous mine workings would be consolidated by drilling and grouting in order to prevent potential collapse. Boreholes would be drilled into the mine working void to the base of the mine entry or a pre-determined depth and grout inserted. The indicative areas of potential mine working consolidation can be seen on Figure 11.8. A suitable method statement, including a detailed monitoring strategy, for grouting work would be prepared and implemented by the contractor to minimise the risk of damage and/or disruption to surrounding land, vegetation and natural features. This would be included within the CEMP.

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## **Piling**

- 4.12.30 Due to the span and height of the viaduct structure crossing the River Garnock piled foundations are required. The highest rock strata in the area is the Upper Linn Limestone (ULL) which is underlain by sandstone, siltstone and mudstones. Artesian ground water is present in the ULL and the underlying rock strata. Water entry into bores is dominated by localised fissure flow with extremely variable permeability.
- 4.12.31 Bored cast in situ piles can be constructed for the viaduct foundations without significantly impacting the water environment by adopting the following design and construction measures:
- Grouting of the solution features in the ULL can be avoided by providing permanently cased piles founded in the rock below the ULL. Structurally, the pile would span any solution features in the ULL.
  - Dewatering can be avoided by constructing the piles with the bores full of drilling fluid. The drilling fluids (either high density fluids or pressurised fluids) would be designed to be balanced against the water pressure at depth thus precluding their flow into the water environment.