A585 Windy Harbour to Skippool Improvement Scheme

TR010035

6.2.1 ES Appendix 2.1: Construction Information

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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Infrastructure Planning

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The Infrastructure Planning Act
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A585 Windy Harbour to Skippool Improvement Scheme

Development Consent Order 201[ ]

ES APPENDIX 2.1: CONSTRUCTION INFORMATION

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1 INTRODUCTION

1.1.1 This appendix provides an overview of the envisaged approach to construction for the A585 Windy Harbour to Skippool Improvement Scheme (the Scheme).

1.1.2 The information presented in this appendix has been prepared to provide a set of assumptions for the purposes of assessing potential construction impacts as reported and committed to within chapters of the Environmental Statement (ES) (document references TR010035/APP/6.1 to 6.19).

1.1.3 This appendix has been written during the preliminary design stage of the Scheme's development. Construction methodology would be subject to change during the continuing design process until the final design is complete and main contractors have been engaged. Sufficient contingency has been added to allow for change. Furthermore, the environmental assessment of construction impacts within the ES has considered this uncertainty and incorporated a precautionary approach.

1.1.4 The Rochdale Envelope (Advice Note 9: The Rochdale Envelope) (Planning Inspectorate, 2018) is described as the likely worst-case scenario for the purposes of environmental impact assessment. The descriptions within this construction information, along with the draft order limits, has been set out to represent the likely worst-case scenario for environmental assessment using information available at the time of writing.

1.1.5 Information is set out under the following headings:

- General site operations
- Construction programme and phasing
- Typical construction methods
- Land requirements
- Public access, site access, and traffic management

1.1.6 The Outline Construction Environmental Management Plan (CEMP) (document reference TR010035/APP/7.2) sets out a series of objectives and measures to be applied throughout the construction period in terms of management and operation of the works, environmental protection and limits to disturbance from construction activities. It also outlines how stakeholders, including both local authorities and statutory environmental bodies, would be engaged and consulted with during the construction phase.

1.1.7 The Traffic Management Plan (TMP) (document reference TR010035/APP/7.5) describes possible arrangements for temporary traffic management phases during construction and also includes:

- Permitted and prohibited routes for construction traffic
- Routes for pedestrians and cyclists adjacent to the construction works
- Provisions for construction traffic at site access and road crossing locations
- Temporary diversion routes
- Temporary speed limits

2 GENERAL SITE OPERATIONS

2.1 Site Layout

2.1.1 For construction purposes, the Scheme would be divided into 4 main sections:

1) Skippool Junction to Skippool Bridge Junction
2) Skippool Bridge Junction to Poulton Junction
3) Poulton Junction to Garstang New Road
4) Garstang New Road to Windy Harbour Junction

2.1.2 Refer to the General Arrangement Plan (document reference TR010035/APP/2.5) for a representation of these sections.

2.1.3 Sections 1 to 4 are all related to the new highway layout and are expected to be open to traffic by Summer 2022.

2.1.4 Each construction section is largely self-contained by geographic barrier like A586 Garstang Road East.

2.1.5 The Scheme would involve substantial earthworks and import of material. Where fill material would be required, it has been designed as far as is practicable to come from within the same section of works. The remaining import would be sourced locally or obtained from the proposed borrow pits described in Section 4.5 below.

2.1.6 Only where required material cannot be provided from within the Scheme section, either due to insufficient material or the wrong type of material, the required material would be imported onto the Scheme via the existing road network.

2.2 Safety and Security

2.2.1 The Outline CEMP (document reference TR010035/APP/7.2) sets out a number of safety issues that the Contractor would need to consider which include but are not restricted to:

- Working adjacent to built-up areas
- Working in, over or adjacent to watercourses including the Main Dyke and the tidal Horsebridge Dyke (Skippool Creek)
- Working on or adjacent to public roads, footpaths or cycle tracks or in proximity to live traffic
- Working at height
- Undertaking electrical works
- Working over or adjacent to, or diverting statutory undertakers' plant
- Handling contaminated materials

2.2.2 The construction site, compounds and storage areas would be secured from public access.

2.3 Working Hours

2.3.1 Working hour constraints are specified in requirement 4 of Schedule 2 of the draft Development Consent Order (document reference TR010035/APP/3.1).

2.3.2 In summary, the typical core working hours for the Scheme are expected to be between 08:00 and 18:00 on weekdays (excluding bank holidays) and from 08:00 to 16:00 on Saturdays. In addition, there would be a start-up and close down period of one hour either side of these times to maximise efficiency of the core hours. This would include activities such as deliveries, staff travel to work, maintenance and general preparation works, but not include running plant and machinery that are likely to cause a disturbance to local residents or businesses.

2.3.3 It is expected that some works would need to be carried out at night, road crossings and final surfacing tie ins for example. Night working would be agreed in advance with the local authority.

2.3.4 Seasonal construction activities such as earthworks could be subject to an application for extended hours working to make best use of the season. The expected extended working hours would cover 07:00 to 08:00 and 18:00 to 20:00 during week days.

2.3.5 Repairs or maintenance of construction equipment (other than emergency repairs) would typically be carried out outside of core working hours, normally on Saturday afternoons (13:00 to 18:00) or on Sundays between 09:00 and 17:00.

2.4 Site Lighting

2.4.1 Site lighting would generally be required as follows:

- Provision of lighting for Contractor's compounds for security and safe movement of staff during winter mornings and evening
- Provision of road lighting along temporary access roads
- Provision of temporary road lighting to maintain at least an equivalent level of lighting where there is existing lighting in place prior to construction
- Provision of temporary road lighting where there is currently no lighting, as lighting is required as a safety measure under temporary traffic management
- Provision of task lighting required for night time activities or winter afternoon activities, such as installation of bridge beams

2.4.2 Maintenance of road lighting at locations where the layout is to be changed would be provided by early commissioning of permanent new lighting where feasible, powered by generators, if necessary. Where this is not feasible lighting may be provided by temporary mobile lighting towers or by use of columns in temporary locations.

2.4.3 Light spill from temporary lighting at Contractor's compounds and at other locations would be minimised beyond the compounds and working areas by the use of directionally controlled lighting including the baffles.

3 CONSTRUCTION PROGRAMME AND PHASING

3.1 Construction Programme

3.1.1 The construction of the Scheme would be programmed to take approximately 2 years to complete starting in Spring 2020 and finishing in Summer 2022.

3.1.2 Environmental surveys and mitigation measures would be carried out prior to starting construction works.

3.1.3 For the following sections reference should be made to the TMP (document reference TR010035/APP/7.5) for the traffic management (TM) phasing diagrams.

3.2 Skippool Clough Culvert

3.2.1 It has been decided that the existing culvert would need to be replaced in the near future and a route immediately east of the existing culvert has been identified. The culvert may be replaced in advance of the Scheme or at the start of the Scheme's construction. The indicated sequence of works described below assumes that this would be done before the main construction of the Scheme. Construction would commence at the north end of the new culvert using conventional excavation techniques across the existing carriageways. The new culvert would pass under several items of utilities apparatus that would, at least, have to be supported during construction.

3.2.2 Initially, it would be necessary to provide temporary widening of the carriageway adjacent to the existing main roundabout island to allow for the following traffic management layouts.

3.2.3 The first phase would comprise:

- Construction of a temporary sheet piled cofferdam at the north end of the proposed culvert to allow working in the tidal part of Horsebridge Dyke / Skippool Creek
- Close temporarily the existing footway/cycleway on the north side of the existing roundabout and indicate alternative diversion routes around the roundabout
- Reduce the number of lanes on the west (A585), north (Skippool Road) and south (Breck Road) approaches to the roundabout as well as the nearside lane on the north side of the roundabout
- Excavate through the verge and part of the carriageway and install the northern 20m length of culvert units, backfill and reinstate footway and carriageway
- Construct the northern headwall with tidal flap valve, alter existing highway drainage to connect to the northern headwall

3.2.4 The second phase would comprise:

- Rearrange traffic management on the north and south sides of the roundabout to provide working space on the roundabout main island
- Excavate through part of the carriageway and roundabout island and install the middle 40m length of culvert units, backfill and reinstate carriageway and roundabout

3.2.5 The third and final phase would comprise:

- Close temporarily the existing footway/cycleway on the south side of the existing

roundabout and indicate alternative diversion routes around the roundabout

- Rearrange traffic management on the south side of the roundabout and A588 Breck Road approach to provide working space for the southerly section of the new culvert
- Excavate through the part of the southern roundabout carriageway and footway install the southern 25m length of culvert units, backfill and reinstate footway and carriageway
- Construct the southern headwall
- Decommission and backfill the existing culvert and removal of the existing culvert headwalls, Remove the temporary cofferdam
- Remove temporary traffic management

3.2.6 It is estimated that these works would take about 4 months to complete.

3.3 Skippool Junction

3.3.1 The construction of this section of works links along the A585 to the Skippool Bridge Junction area and includes permanent diversions of utilities apparatus mostly into the new northern footway adjacent to the eastbound carriageway.

3.3.2 This section of the works would require a new 4-way signalised junction to be built on the footprint of the existing roundabout. To create the working space required to allow the new configuration to be built, the functionality of the roundabout would be maintained but utilising a smaller circumference. The first activity at this junction would be to install TM to create a lane width around the centre of the roundabout for a site access and then within this area break out all the existing infrastructure and replace with full depth construction to the new road alignment. Once these works have been completed the smaller temporary roundabout would be installed.

3.3.3 Phase 1 TM assumes that the north, east and west approaches to the roundabout could be restricted to a single lane in each direction to maximise the available working area and allow the new traffic islands to be built. The southern approach would remain unaltered. As part of the Phase 1 works in addition to the main carriageway being built on its new alignment, splitter islands would be built or partially built to allow these to be utilised as part of the next phase. The existing northern footway alongside Breck Road and across the eastern arm of the roundabout would be closed and diversions indicated around the Skippool Roundabout and along the southern footway of Breck Road service road.

3.3.4 Utility diversions that cannot be completed prior to the construction works would be carried out and co-ordinated within each phase.

3.3.5 The Phase 2 TM would be installed switching traffic to the newly built eastbound carriageway. The switch to this phase would be dependent on the northern half of Skippool Bridge to be open to traffic. Pedestrians and cyclists would be diverted to use the new northern footway alongside the new eastbound carriageway.

3.3.6 The existing traffic island on the Breck Road southbound approach would have been removed as part of the traffic switch with the traffic approaching from the south now restricted to single lanes at the roundabout approach. This phase would allow the re-construction of the westbound carriageway and the service road in front of the houses to the east of the existing roundabout.

3.3.7 Phase 3 would see the junction being controlled by temporary traffic signals while the remaining traffic islands are completed. With all the new islands completed a final period of works would be undertaken to complete any outstanding areas of surface course, install the permanent white lining and complete and commission the traffic signals.

3.4 Skippool Bridge

3.4.1 Skippool Bridge would be built in 2 main phases. Phase 1 would see the off-line northern half of the bridge built, with traffic remaining on the existing A585 with slightly reduced width lanes and pedestrian / cyclists using the southern footway.

3.4.2 Phase 1 of the bridge construction would comprise:

- Site clearance including the demolition of the West Wynds property on Old Mains Lane
- Divert existing highway drainage outfalls and installation of temporary sheet piling to form a piling platform within the banks of Main Dyke north of the existing bridge
- Installation of bored concrete piles on both sides of Main Dyke to form the supports to the bridge abutments and wing walls adjacent to the northern end of the abutments, remove temporary sheet piling
- Installation of precast concrete bridge beams onto the bridge abutments
- Construction of an in-situ concrete deck including provision for the utilities apparatus under the northern footway
- Install the diverted utilities apparatus within the bridge deck – note this is coordinated with the diversion works from Skippool junction through to Old Mains Lane link road
- Complete road and footway construction on the approaches and over the bridge
- Divert traffic and pedestrians/cyclists onto the new bridge eastbound carriageway and footway

3.4.3 Phase 2 of the bridge would commence once traffic had been diverted from the existing road, the existing bridge would be demolished and existing utilities apparatus removed.

3.4.4 For the southern half of the bridge, the sheet piling for a piling platform, installation of bored piles for the bridge abutments, bridge beams, in-situ deck, road / footway construction and utilities diversions would be similar to that indicated for Phase 1 described at 3.4.2 above.

3.5 Skippool Bridge Junction

3.5.1 The switch between Phase 1 and 2 for the bridge construction would be co-ordinated with Phase 2 at Skippool Junction and Phase 3 at Skippool Bridge Junction to avoid chicaning traffic and to allow for continuity of utility apparatus diversions.

3.5.2 For most of the works at this junction the intention would be to maintain the traffic on the existing alignment as shown in the TM Phasing diagrams and construct as much of the new junction off-line as possible.

3.5.3 Phase 1 works would maintain traffic on along the existing alignment to Old Mains

Lane and include the following works:

- Part construction of the Old Mains Lane retaining wall up to Old Mains Lane
- Re-alignment of Old Mains Lane
- Drainage works to start utility diversion works
- Commence utility diversion works
- Commence roadworks
- Early works to the approaches to the north half of Skippool Bridge.

3.5.4 Phase 2 works would commence once local traffic is diverted onto the new alignment for Old Mains Lane link road and include.

- Completion of the Old Mains Lane retaining wall
- Continuation of the roadworks North and South of the existing A585
- Continuation of the utility diversions
- Completion of the approaches to the north half of Skippool Bridge

3.5.5 Phase 3 TM would be installed and co-ordinated with the switch of traffic onto the newly constructed northern half of Skippool Bridge and Phase 2 at Skippool Junction. Works in this phase would include

- Completion of the junction roadworks
- Roadworks to the approaches to Skippool Bridge south side

3.6 Skippool Bridge Junction to Poulton Junction

3.6.1 This off-line section of the new southern bypass would require a significant volume of import fill material (circa 200,000 cubic m) to achieve the new vertical alignment across the Main Dyke flood plain and would comprise the following activities:

- Site clearance, topsoil strip and storage
- Installation an array of vertical band drains to accelerate settlement of the embankment
- Excavation of temporary flood compensation basins
- Installation of 4 culverts along the line of existing field ditches
- Move fill material from elsewhere on site or import it from off-site including a lower granular drainage layer and additional 0.5m depth of fill to surcharge the embankment at a rate of approximately 950 m^3 per day to meet the current programme dates. Vehicle access would be via Poulton Road Junction, to minimise access disruption during construction of Skippool Bridge Junction.
- Following completion of the fill operation a settlement period of 12 weeks would be required before further works are carried.
- Once the settlement period is complete and surveys confirm that no further settlement is expected, drainage and roadworks would be carried out.

3.7 Poulton Junction

3.7.1 Works at this location would involve the construction of a new at grade signalised

junction on the line of the existing A586. Works are programmed to start following the completion of the import of fill material detailed in the Section 3.6 above. This would allow unrestricted access for deliveries and minimise the risk of delays to the critical earthworks operation. Poulton Junction would be split into 3 phases.

3.7.2 Phase 1 would maintain traffic on the existing A586 Garstang Road East alignment and includes the following works.

- Drainage works to allow utility diversion works
- Utility diversions
- Water main protection or diversion south of Garstang Road East
- Roadworks following utility diversions.

3.7.3 Phase 2 would require the A586 2-way traffic temporarily diverted to the south of the existing road to allow the works to of the northern half of the junction and along the alignment of the existing road to be completed.

3.7.4 Phase 3 would switch the traffic back to the through the new junction along the existing road to allow the southern part of the junction to be completed.

3.8 Poulton Junction to Lodge Lane Bridge

3.8.1 Works in this section could start later in the programme as most of the works are not critical. However, works would start early so that the bulk of the earthworks can be carried out in the summer 2020. This would reduce the risk of weather delays and allow a contingency to complete the earthworks the following season if needed, given the available programme float in this section.

3.8.2 It should be noted that excavation from borrow pits on both north and south sides of the bypass may be used to provide material for the embankment between Skippool Bridge and Poulton Junctions.

3.8.3 Following completion of the bulk earthworks drainage and roadworks could progress towards Lodge Lane Bridge, stopping short of the bridge until completion of the wing walls later in the programme. Once the bridge wing walls are complete the remaining roadworks would be completed.

3.9 Lodge Lane Bridge

3.9.1 Phase 1 - To enable the bridge works to be completed and maintain access to Lodge Lane a temporary road diversion would be installed to the west of the existing alignment, including temporary utility diversions and probably temporary street lighting. (refer to the TMP for the TM phasing diagrams). Once traffic is diverted onto the diversion the following works would take place in phase 1:

- Secant bored piling for abutments, the sections of retaining walls north and south of the bypass from Lodge Lane to the existing Singleton Hall driveway and the bridge central pier. These piles would be installed from the existing ground level
- Localised excavation for the construction of the pile caps for the abutments and central pier support
- Deck construction comprising precast concrete bridge beams and an in-situ concrete deck including ducts for utilities apparatus diversions

- Construct the permanent diversion of the Singleton Hall driveway along a route south of the proposed bypass and Lodge Lane bridge. This would connect to the temporary diversion of Lodge Lane. Permanent diversions of utilities apparatus would be carried out as part of these works along the line of this new section of the Singleton Hall driveway

3.9.2 Phase 2 – Once the piling is complete up to the existing Singleton Hall driveway the following works would take place:

- Completion of the east retaining walls piling north and south
- Construction of the pile wall capping beams

3.9.3 Phase 3 – Traffic would now be diverted from the temporary western diversion over the new bridge, allowing the following works:

- Removal of the temporary diversion
- Excavation of earthworks under the bridge and between the retaining walls east of the bridge
- Construction of the bridge wing walls west of the bridge
- Facing cladding to the piled retaining walls and central bridge pier would take place following excavation and run in parallel with the drainage and roadworks in this section

3.10 Lodge Lane Bridge – Grange Footbridge (Garstang New Road)

3.10.1 Works in this section would start with topsoil strip to allow construction of a haul road to the Lodge Lane Bridge site. The installation of this haul road would minimise the need to use Lodge Lane to access the bridge construction area. However, this section is crossed by a major water main that would have to be diverted and protected before the haul route can be used.

3.10.2 Earthworks in this section would be split into 2 areas. The area between the 2 piled retaining walls at Lodge Lane Bridge would not be excavated until completion of the capping beams. This would allow the capping beams to be constructed at ground level and remove the need to work at height. The remaining area up to Garstang New Road (Ch3900) would not depend on the completion of the capping beams and is programmed to start following completion of the earthworks in the Skippool Bridge Junction to Poulton Junction section for resource continuity.

3.11 Garstang New Road to Windy Harbour Junction

3.11.1 This section of the works is predominantly on line widening on the south side of Garstang New Road and has be programmed in 3 phases.

3.11.2 Phase 1 would involve construction of a new embankment adjacent to the existing A585 to carry the westbound traffic. Construction of balancing ponds and extensions to the existing flood culverts would also occur during this phase.

3.11.3 Phase 2 would switch traffic to the newly constructed westbound carriageway to allow works to be completed to the eastbound carriageway and would pass under the footbridge to temporarily reconnect with Garstang New Road west of the footbridge.

3.11.4 Phase 3 would send 2-way traffic down the westbound carriageway of the bypass and is dependent on all other work areas being complete and ready to receive traffic. In this phase the tie in works and works to the existing Garstang New Road would be

completed.

3.12 Grange Footbridge

3.12.1 Grange footbridge is located off-line of the existing Garstang New Road and would not need traffic diversions to allow for its construction. A protection slab would be required over an existing pipeline east of the bridge site.

3.12.2 Temporary diversions through the site would be required for the existing public footpath running south from Garstang New Road. Once the footbridge construction is completed then the footpath would be diverted over the footbridge.

3.12.3 The programme for the construction of Grange Footbridge is linked to the 3 TM phases in the Garstang New Road to Windy Harbour Junction section and would start following completion of the utility diversion.

3.12.4 Phase 1 would include the construction of the bases for the north and south supports and both sets of ramps and stairs. Once these are in place the main bridge span would be installed.

3.12.5 Final tie in to the existing footpath would be carried out in Phase 3.

3.13 Existing Road to be De-Trunked

3.13.1 The existing A585 that would be bypassed extends from Mains Lane at Skippool Bridge Junction to Garstang New Road at Grange Footbridge. This section of road is proposed to be de-trunked and transferred to Lancashire County Council as the local highway authority.

3.13.2 A variety of improvement works are proposed along this section of the existing roads including:

- Provision of shared footway/cycleway along Mains Lane between Skippool Bridge junction and Little Singleton junction
- Improvements to Shard Road traffic signal junction
- Change of speed limit along Mains Lane between Shard Road junction and Little Singleton junction
- Improvements to Little Singleton traffic signal junction
- Conversion of Garstang New Road to provide only field access and provision for cyclists and pedestrians between Little Singleton and Windy Harbour junction

3.13.3 All the above works would be carried out after the bypass was fully opened to traffic to minimise disruption on the existing road.

3.14 Critical Path

3.14.1 The outline critical path is detailed below.

3.15 Key Dates and Milestones

Table 3-1: Indicative Key Dates and Milestones

Indicative Key Dates / Milestones	Date	Duration
Start of construction on site	25-Jun-20	22 Months
Switch traffic onto North of Skippool Junction bridge	11-May-21	
Completion of new Skippool Bridge	03-Mar-22	
Commission temp traffic signals at Skippool Junction	11-Nov-21	
Commission permanent traffic signals at Skippool Junction	08-Feb-22	
Completion of fill and surcharge Ch 800 - 2200	24-May-21	
Completion of roadworks Ch 800 - 2200	19-Jan-22	
Complete Poulton Junction	23-Mar-22	
Switch Lodge Lane traffic onto temporary road	17-Sep-20	
Switch traffic to new Lodge Lane Bridge	21-Jul-21	
Planned construction completion	29-Apr-22	

4 TYPICAL CONSTRUCTION METHODS

4.1 Utility Diversions

4.1.1 There are a number of utility diversions that would form part of enabling works in advance of, or are integrated into, the construction of the Scheme. These include diversion or protection work upon the assets of:

- Electricity North West (underground and overhead power supplies)
- Cadent (National Grid) Gas pipes and supplies
- Thornton Facilities Management (Former ICI Pipeline)
- United Utilities (Water and sewers)
- British Telecom – Openreach (underground and overhead cables)

4.1.2 For the purposes of this assessment, all utility diversions are considered as part of the Scheme.

4.1.3 The makeup of the utility diversion works are of a similar nature to those of initial elements of the road construction in that they would involve localised site clearance, excavations and back fill for underground services and standard civil engineering practices for overhead lines.

4.1.4 The works diverting underground services would involve either directional drilling apparatus or open trench work as appropriate within the programme of construction works at any one location.

4.1.5 Overhead services would be either diverted but retained overhead or diverted by burying underground.

4.2 Environmental Mitigation

4.2.1 The environmental mitigation measures for the Scheme are detailed throughout the Environmental Statement (documents reference TR010035/APP/6.1 to 6.19).

4.2.2 The construction programme would be phased to accommodate mitigation within sensitive areas before construction commenced in those places including the demolition of any buildings such as West Wynds and The Beeches.

4.2.3 Some environmental mitigation would run concurrently with the construction of the Scheme where practicable and within the constraints of applicable licences and permit consents.

4.3 Site Clearance and Demolition

4.3.1 Annex A shows the worst-case plant and machinery that would be used for site clearance.

4.3.2 Off-line sections would be cleared of vegetation during daytime working hours. On-line sections would be cleared during night time with traffic management if required, according to Highways England network occupancy guidelines.

4.3.3 All arisings would be taken off-site. No fires would be permitted within the Scheme footprint.

4.4 Establishment of Construction Compounds

4.4.1 An indicative location of the Scheme construction compounds is shown on the General Arrangement Plans (document reference TR010035/APP/2.5).

4.4.2 After environmental mitigation and site clearance, typically the establishment of construction compounds would involve the following activities:

- Defining the boundary using fencing or temporary noise bunding
- Soil stripping, placing and compacting stone for compound base
- Setting up drainage as required, including perimeter drainage
- Creating access tracks with bound material surfacing if required
- Setting up power requirements including generators
- Setting up offices, welfare facilities and wheel washing
- Installation of security / access gates

4.4.3 The plant used for this operation would be typical of that for road construction as described in Annex A.

4.4.4 Compounds are expected to accommodate office and welfare facilities, plant and machinery parking, storage facilities, maintenance areas and workshops, and on-site temporary residential premises.

4.4.5 It is anticipated that, where practicable, compounds would be returned to the previous land use after decommissioning in agreement with landowners.

4.5 Borrow pits

4.5.1 If borrow pits are to be used within the Scheme they would be established in a similar way as the construction compounds described above.

4.5.2 Following site clearance, the site boundary would be fenced, and security gates installed at the site entrance to prevent unauthorised access. Topsoil and subsoil layers would be stripped and stored around the perimeter of the site to buffer local receptors from the operations within the borrow pits and minimise the transportation of material around the Scheme. In general, topsoil stored closest to boundary would be up to 2m high and subsoil/overburden behind this would be up to maximum of 3m high.

4.5.3 Access tracks would be constructed, along with any infrastructure to be sited within the boundary as per the construction compounds.

4.5.4 Interception drains would be installed to prevent excessive ingress of surface water into the workings. Suitable surface water settlement ponds would be created to prevent the contamination of nearby surface watercourses with sediments and suspended solids.

4.6 Haul Routes

4.6.1 Dedicated haul routes are identified on the Scheme and can be seen within Figure 3.1 in Chapter 2 of the Environmental Statement (document reference TR010035/APP/6.2). As well as the new haul routes shown, the route alignment on the off-line sections would be used as a main haul route during the construction phase.

4.6.2 Where on new alignments, temporary haul routes would be created by stripping the

topsoil and replacing with capping material to create a hard-standing surface suitable for heavy goods and off-road vehicles.

4.7 Earthworks and Vehicle Movements

4.7.1 The phased construction programme described above has been cross-referred with the material requirements of the Scheme to provide a monthly programme of predicted earthworks quantities and main Scheme construction activities (road construction, structures and demolition). Vehicle movements throughout the programme and across the phases of the 4 construction sections of the Scheme have been calculated accordingly. To represent the likely worst-case scenario, vehicle movements have all been qualified as heavy goods vehicle (HGV) movements

4.7.2 At this preliminary design stage, a contingency of 10% additional fill material has been incorporated across the programme to account for unknown factors associated with earthworks. Also, a contingency of between 10% and 35% additional HGV movements has been incorporated to account for deliveries. The level of contingency applied was determined based on professional judgement having regard for the section of the works and the uncertainty in number of vehicle movements to deliver specific components.

4.7.3 The expected daily and monthly HGV movements across the Scheme are presented within Annex B.

4.7.4 For the earthworks aspect of the Scheme, typical earth moving vehicles would be either articulated dump trucks for site movements, capable of carrying 20m^3 of material (approximately 35 tonnes), or tipper trucks for both site and on-road movements of material, capable of carrying 12m^3 (approximately 20 tonnes). The appropriate type of vehicle has been accounted for in calculating the estimated vehicle movements associated with each section of the Scheme.

4.8 Staff Accommodation and Welfare

4.8.1 It is anticipated that a likely worst case peak labour force of between 100 and 150 and could be employed on the Scheme during the busiest period of construction.

4.8.2 Accommodation, offices, welfare (canteen and washing facilities), fleet parking and storage depots are expected to be located within compounds already described. Temporary buildings would make up the infrastructure of the compounds during operation. Typically, these would be made up of portable modular units typical of large construction sites. Some buildings would be stacked one on top of the other for efficiency of space within the sites. The maximum stack would be expected to be 2 modular units high.

4.8.3 It is expected that all soil storage areas would have welfare facilities within them. Where the distance between soil storage areas is too great for the number of workforce in a particular location, mobile welfare vans would be on site to minimise journeys by the workforce.

4.8.4 All proposed compounds and soil storage areas are located within close proximity of the Scheme alignment, which would help to lower traffic to and from site once depot plant and personnel are installed within compounds.

4.8.5 It is expected that most of the workforce would arrive on site via the strategic road network, avoiding local access roads where practicable.

4.9 Road Construction

4.9.1 Pavement construction involves building the pavement up in layers. Subject to the ground conditions and likely traffic loading, a typical road construction could be:

- 35mm thin surfacing
- 55mm binder course
- 85mm upper base
- 200mm lower base
- 280mm stabilised sub base
- 400mm capping

4.9.2 The bottom layer (sub-base) is a crushed rock aggregate which would be delivered to the site via the strategic road network. The material is deposited and then pushed into place and compacted.

4.9.3 The upper pavement layers would be made up of bituminous material. All of these would require the transport of bituminous material to the site from local batching plants.

4.10 Roadwork Finishes

4.10.1 Following pavement construction, vehicle restraint systems (VRS) or safety barriers would be installed. There are various types of Highways England approved VRS models available. Steel vehicle restraint systems would be employed along the verge lengths, parapets and bridge connections. Steel barrier installation would involve driving steel posts into the ground or excavating small footings and placing concrete into which the posts are set. The barriers are bolted to the posts and fixed to small concrete foundations.

4.10.2 Sign installation would involve excavation for the foundations, poured concrete and then setting the posts. The sign faces are then fixed to the sign posts. Some signs would be lit and would require cabling to be passed through service ducts.

4.10.3 Road markings would be sprayed onto the road surface using specialist lorry mounted equipment. This is a mobile operation with zero waste material from the thermoplastic paint mixture used.

4.11 Structures

4.11.1 The Scheme would involve construction of 3 new bridges being:

- New Skippool Bridge
- Lodge Lane Bridge
- Grange Footbridge

4.11.2 The locations of the above are shown on the General Arrangement Plans (document reference TR010035/APP/2.5).

4.11.3 Structure sections are contained in the Engineering Section Drawings (document reference TR010035/APP/2.6).

4.11.4 A standard pattern of work for a bridge would include:

- Bored piling

- Pouring concrete foundations
- Formwork and pouring concrete to form piers and abutments to hold up the bridge deck
- Laying down prefabricated bridge beams by crane
- Building the bridge deck, waterproofing
- Dressing the bridge with parapets, barriers and a blacktop bituminous layer

4.11.5 All bridge beams would be precast or prefabricated offsite and brought in by road.

4.11.6 It should be assumed there would be up to an average of 6 weeks of bored piling work at each new structure. Exceptions to this are at Lodge Lane Bridge where the Eastern retaining walls are contiguous bored piled taking up to 6 months to install.

4.11.7 Bridge deck beams would all be either pre-cast concrete or pre-fabricated steel and would be transported to site by road. There would be careful planning with regards the routing of these loads, avoiding sensitive routes where practicable.

4.12 Drainage

4.12.1 Culverts, headwalls, outfalls, pipes, ironworks and manhole rings would be constructed in-situ.

4.12.2 It is envisaged that numerous sheet piling operations would take place for temporary works/ground support for excavations during drainage installation. Modern sheet piling techniques do not necessarily require percussive plant use, although this might remain an option in open spaces with no sensitive receptors close by and where the ground conditions do not permit alternatives.

4.12.3 Balancing ponds and swales would make up part of the earthworks element.

4.13 Intelligent Transport Systems (ITS)

4.13.1 Amongst the assets within the ITS criteria for the Scheme are traffic signals, traffic detection loops within the road surface, closed circuit television (CCTV), telephones and the required ducting to carry cables between assets.

4.13.2 The construction sequence normally starts with construction of concrete foundations, followed by installation of mast or traffic signal poles. The equipment would then be installed on to the mast/poles and electrical connections made and commissioned.

4.13.3 Cabling involves minor engineering work for trenching, installation of ducts, cables and construction of draw pits and cabinets. Cross carriageway ducts are installed for connection of equipment in the central reserve or crossing the entirety of the carriageway and can be either constructed using a trench or directional drilling, with the latter requiring an area for a reception pit. Traffic detection would be either via loops cut into the completed carriageway surface or via radar detection.

4.14 Lighting

4.14.1 Lighting would be restricted to junctions. Lighting columns would be of highways standard. Columns would be transported via the road, using the existing strategic road network to arrive on site and then navigate via the haul routes to in-situ locations. Cable drums and electrical cabinets would be stored in a dry facility at the main compound.

4.15 Materials

4.15.1 The raw materials required for the Scheme include primary aggregates, particularly sand and gravel. It has been identified that the Scheme is located over existing areas of gravel, sand and clay and as such, material from the existing area would be used where practicable although the relative quantities of such materials is small and will require materials to be imported to the site.

4.15.2 Construction demolition and excavation wastes would also be considered as an alternative to primary aggregates.

4.15.3 The appropriate quantities of particular materials that would be required by the Scheme are identified in Table 4.1.

4.15.4 At this preliminary design stage, there is a degree of uncertainty about material volumes and their sources. In order to ensure the assessment of likely significant effects from the likely worst-case scenario during construction, all material volumes quoted include a contingency of 10%.

4.15.5 The likely worst case comprises of imported major material types being fill material, blacktop and concrete. Aggregates would either be sourced from a borrowpit adjacent to the Scheme or from local quarries.

4.15.6 To cover uncertainty in the source locations of imported fill materials, it is assumed that up to 60% of the total fill materials required for the Scheme would be imported (incorporating the contingency of 10%) in respect of construction vehicle movements accessing the Scheme from offsite.

Table 4-1: Estimated Material Quantities

Construction Material Required	Estimated quantities of materials	
	From site	Imported
Blacktop	0 m^3	35,000 m^3
Sub base	0 m^3	16,500 m^3
Granular fill for capping and drainage blanket	4,500 m^3	140,000 m^3
General fill	190,000 m^3	140,000 m^3
Concrete	0 m^3	16,000m^3
Steel (including structural steel, lighting columns and safety fence etc.)	0 tonnes	200 tonnes

4.16 Clearance of Site on Completion

4.16.1 Clearance of the soil storage and compound sites upon completion of the works would normally involve small dumpers, excavator/loaders and lorries to gather up and dispose of surplus material and return the ground to the condition in which it was found.

5 LAND REQUIREMENTS

5.1 Land Required During Construction

5.1.1 Land required during construction may be in addition to that required for the footprint of the permanent works. The main requirements are described below. All land required for temporary use within the construction of the Scheme is within the Draft Order Limits submitted as part of the Development Consent Order application and is shown on the Land Plans (document reference TR010035/APP/2.2).

5.2 Site Compounds

5.2.1 Where possible site compounds would be located close to the proposed works where there is suitable access. Site compounds would be used to accommodate offices for the contractors as well as workshops, stores, welfare facilities, worker accommodation and parking for vehicles and plant machinery and material storage areas.

5.3 Haul Routes

5.3.1 Although the majority of the Scheme's haul routes would utilise either existing highway, or existing tracks, some land would be required to enable access to the permanent works. Haul routes and access arrangements are shown in the TMP

5.4 Borrow Pits

5.4.1 Owing to the requirement for fill within the Scheme, borrow pits have been identified for providing a combination of aggregate and capping as required by the Scheme. The borrow pits have been located to limit the need to import material or to transfer it from one end of the Scheme to the other.

5.5 Temporary Flood Compensation Areas

5.5.1 Areas have been identified within the flood risk assessment modelling to provide lower ground to compensate for areas of the floodplain lost during construction.

5.6 Temporary Diversions

5.6.1 In order to maintain traffic flows when undertaking works on the existing highway such as a new bridge or carriageway tie-ins, it may be necessary to provide temporary diversion. Where identified, these are shown in the TMP. In addition, the TMP also indicate safe diversion routes for pedestrians and cyclists away from the work sites.

5.7 Permanent Land

5.7.1 The main requirements for permanent land are as follows:

- Land taken by the earthworks required to accommodate the permanent new highway alignments, i.e. land required to build embankments or excavate cuttings
- Land required to allow adequate drainage of the road and the area through which it passes. This includes land required for diversion of watercourses, drainage outfalls and mitigation features such as attenuation ponds and pollution control units, including arrangements for maintenance access
- Land required for other environmental mitigation such as landscaping, planting and screening

5.7.2 Other land not required for the permanent works may be permanently acquired by the Highways England due to it becoming unusable or impractical to use as a direct result

of the works or because of commitments given in the planning of the Scheme.

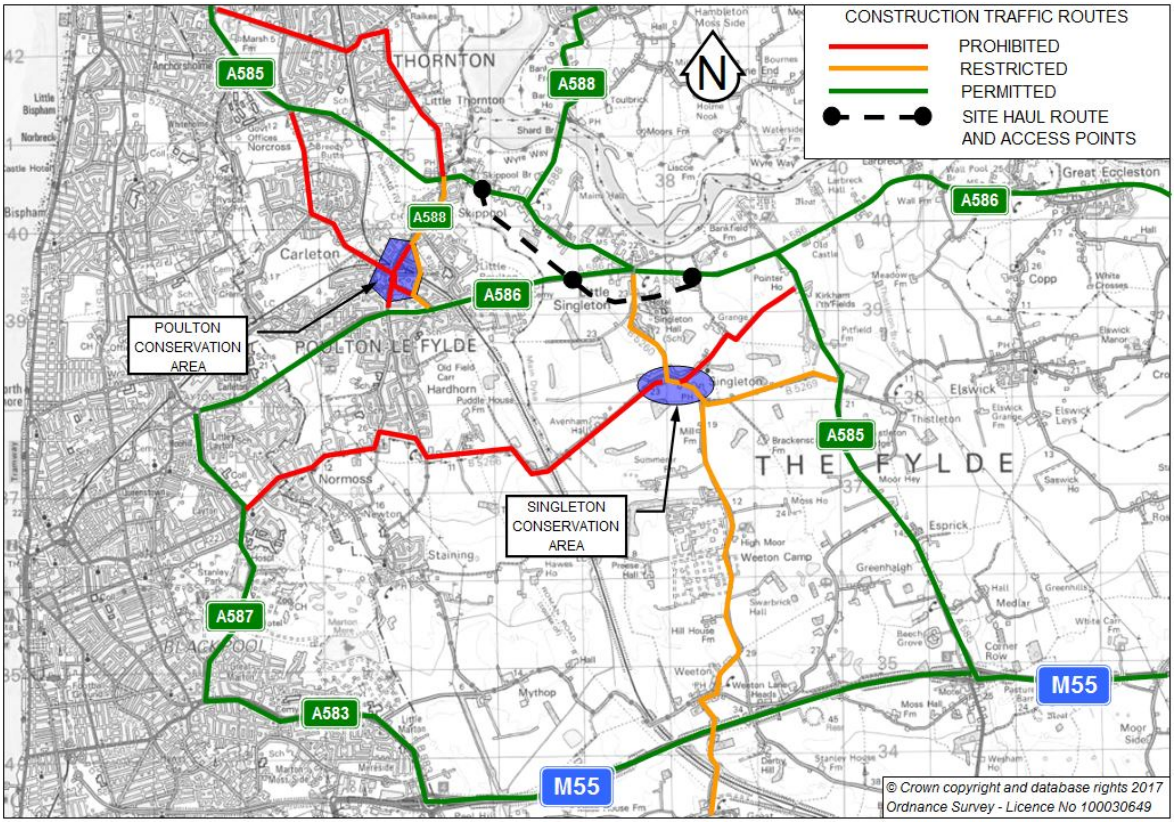
5.7.3 For greater detail on land requirements, refer to the Statement of Reasons, (document reference TR010035/APP/4.1).

6 PUBLIC ACCESS, SITE ACCESS AND TRAFFIC MANAGEMENT

6.1 Access Routes for Construction Traffic

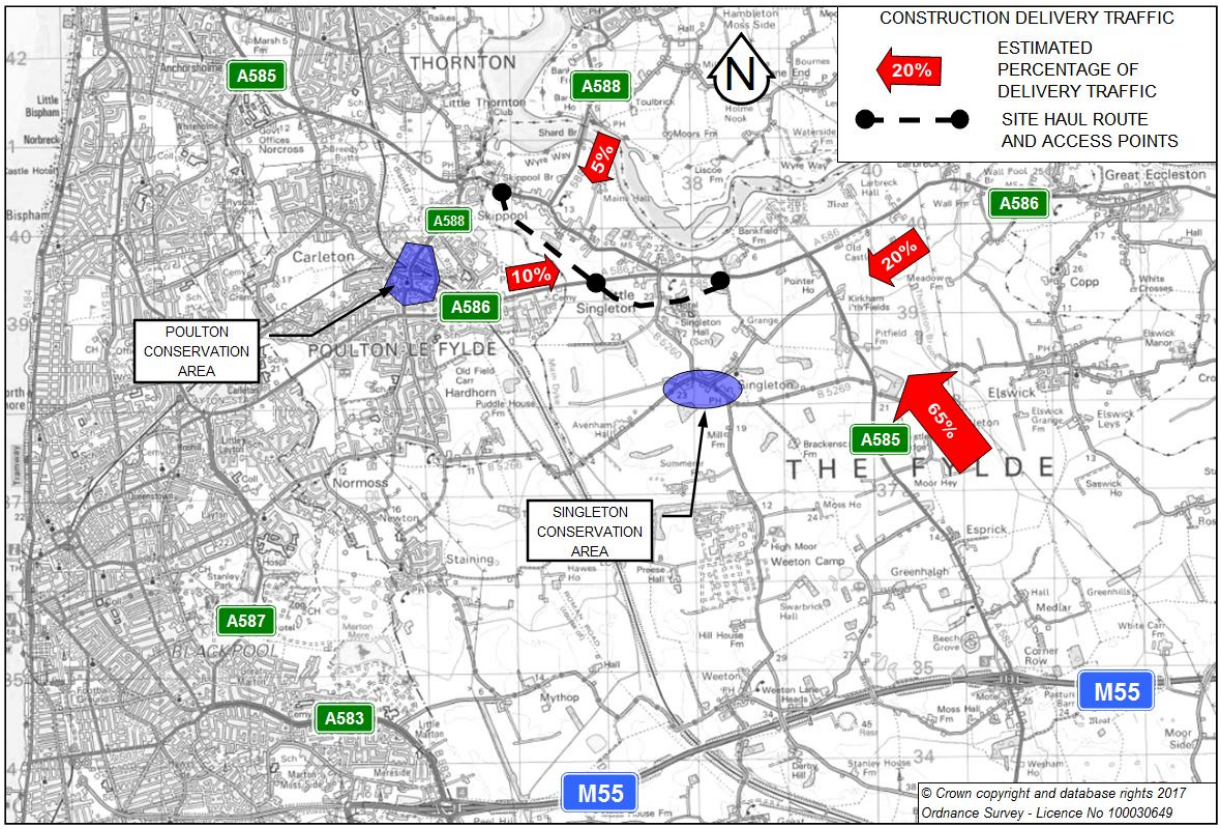
6.1.1 The construction works are generally accessible from the strategic road network and the local authority principal road network so most construction vehicle movements would be able to use these main routes. The contractor would be restricted as to the extent and purpose of using other roads for construction purposes. While it is desirable for all construction related access to be via the major routes it would be necessary to provide some other access for isolated construction areas. These additional routes would be determined in consultation with the relevant local roads authority. Where necessary signage would be provided on roads to indicate that the route is not to be used by the contractor. More detail of this is contained in the Traffic Management Plan (document reference TR010035/APP/7.5).

Insert 6-1: Construction Delivery Traffic Routes



6.1.2 Reference has been made to the Lancashire Mineral & Waste Local Plan to identify existing sources of aggregates and other materials that would be required for the Scheme and an assessment has been made on the routes that such traffic might use to reach the Scheme. An indication of the possible percentage of delivery traffic is shown on Insert 6-2.

Insert 6-2: Construction Delivery Traffic



6.1.3 Within the bounds of the Scheme, it is anticipated that the majority of deliveries would be to the main compound site located near the proposed Poulton Junction and it is estimated that 70% of all deliveries to the site would use A586 Garstang Road East and 30% of all deliveries would use A585 Mains Lane to deliver to the Skippool area.

6.2 Traffic Management Requirements

6.2.1 During construction, temporary traffic management would be required to undertake the works whilst minimising disruption to users of both the existing mainline and the local side road network.

6.2.2 In general, construction phasing and temporary traffic management proposals would be prepared on the basis of keeping the same number of lanes in use as existing during the peak periods of traffic flow. Lane closures would be employed during off-peak times for the facilitation of changes to traffic management, surfacing tie-ins or bridge construction.

6.2.3 For the main routes, it is expected that traffic would be kept on the normal carriageways wherever possible, if necessary using narrow lanes and restricted temporary speed limits through the main works areas.

6.2.4 It is expected that other routes and junctions would be kept open during construction of the new works. This would, in some cases require construction of temporary alignments. The proposals would be prepared on the basis of keeping all routes and accesses open throughout the works.

6.2.5 As well as planning the traffic management proposals to limit wherever practicable road-user delays, the safety of vulnerable road-user groups such as pedestrians and cyclists and other Non Motorised Users (NMU's) would be a particular consideration.

6.3 Works Restrictions

6.3.1 It is generally proposed that the network connection works would be constructed within the typical working hours as set out in this appendix with no requirement or intention for prolonged late night or 24 hour working. The only exceptions to this would be for some surfacing tie-in activities. Alternative diversion routes would be set up during such night time closures, together with advance warning and publicity to help drivers to avoid these locations/dates if possible.

6.3.2 Some further restrictions such as reducing through traffic to 1 lane may be applied in order to carry out critical tie-in works between existing and new carriageways. This would minimise the number of road closures and diversions required. Weekend or night time road closures would be programmed to avoid significant local or national events that might generate substantial increases in traffic. All closures and diversions would require a temporary traffic order and be subject to approval by Highways England, Police and maintaining authority.

6.4 Temporary or Permanent Road Closures or Diversions

6.4.1 Temporary road closures and diversions would be arranged following discussions with the relevant highways authority, police and the maintaining authority. A temporary traffic order giving the requisite notice would be prepared and a statutory notice placed in local newspapers.

6.4.2 Temporary road closures that occur as a consequence of the phasing for the construction of new alignments would be implemented following discussions with relevant parties and agreement of temporary traffic arrangements for the next phase of the works.

6.4.3 The traffic management for the Scheme would follow the guidance in the Road Works and Temporary Situations Chapter (Chapter 8) of the Traffic Signs Manual (Department for Transport, 2009), adopting the following standards as applicable:

- Where heavy vehicles, including public service vehicles are expected, the lane width may be reduced to 3.25m (desirable) or 3.0m (absolute minimum). Lane widths of 3.25m and 3.0m would therefore be used with an appropriate reduction in the speed limit where 2 narrow lanes have to be maintained. A minimum lane width of 3.5m would be adopted where possible
- A minimum lateral clearance of 1.2m between 2-way traffic where temporary steel safety barrier is used, particularly, when the speed limit is 50mph and a minimum lateral clearance of 0.5m between 2-way traffic when the speed is 40mph or below

6.5 Approvals

6.5.1 The main contractor's detailed proposals for traffic management would only be confirmed after discussions with Highways England, Police, maintaining authorities and the appropriate local authorities, where relevant.

6.5.2 The main contractor would be required to appoint a full time Traffic Safety and Control Officer (TSCO) who would be responsible for tasks such as submitting traffic management layout drawings and method statements within the requisite notice period for discussion at regular traffic management meetings. The TSCO would be responsible for ensuring that the temporary traffic management operations are continually monitored and maintained.

7 BIBLIOGRAPHY

7.1 DCO Submission Documents

- General Arrangement Plans (document reference TR010035/APP/2.5)
- Engineering Section Drawings (document reference TR010035/APP/2.6)
- Statement of Reasons, (document reference TR010035/APP/4.1)
- Outline Construction Environmental Management Plan (CEMP) (document reference TR010035/APP/7.2)
- Record of Environmental Actions and Commitments (REAC) (document reference TR010035/APP/7.3)
- Traffic Management Plan (document reference TR010035/APP/7.5)
- Environmental Statement Chapters 1 to 19 (document reference TR010035/APP/6.1 to 6.19)

7.2 Other Documents

Planning Inspectorate (2018) *Advice Note 9 Version 3 The Rochdale Envelope*

Lancashire County Council (2017) *Lancashire Mineral and Waste Local Plan: Joint Lancashire Local Aggregate Assessment*

Lancashire Mineral Resources Map (1:100,000 scale): Mineral Resources Information in Support of National, Regional and Local Planning - British Geological Survey for Office of the Deputy Prime Minister

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Annex A – Typical Plant and Machinery – Worst Case from a Noise and Vibration Perspective

Sound power levels for plant items provided in the tables within this annex are taken from BS5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites (noise) (British Standards Institute, 2014) and supplemented with measured data where levels are unavailable in the standard.

Skippool Junction

Stage	Plant	Sound power Level (dBA)	Number (per work gang)	On time % (daily average over 1 month)
Site clearance	Excavator (15t)	101	1	60%
	Chainsaw	114	2	100%
	Chipper	116	2	100%
Earthworks	Excavator (20t)	99	1	70%
	Lorry delivery	109	3	70%
	Roller - static	108	1	70%
Drainage	Vibratory roller	108	1	70%
	Excavator (JCB)	97	1	70%
	Excavator (15t)	101	1	70%
Roadworks	Excavator (20t)	99	2	70%
	Excavator (JCB)	97	1	70%
	Vibratory roller	108	1	70%
	Wheeled dumper (6t)	101	1	25%
	Lorry delivery	109	3	20%
Pavement	Paver and tipper lorry	105	1	80%
	Roller - static	108	1	80%
	Lorry delivery	109	2	80%
	Compressor	102	1	5%

Skippool Bridge

Stage	Plant	Sound power Level (dBA)	Number (per work gang)	On time % (daily average over 1 month)
Site clearance	Excavator (15t)	101	1	60%
	Chainsaw	114	1	25%
	Chipper	116	1	25%
Earthworks	Excavator (15t)	108	1	90%
	Lorry	109	2	90%
Abutments	CFA crawler mounted rig	108	1	50%
	Mobile crane (55t)	98	1	50%
	Excavator (15t)	101	1	50%
	Concrete mixer truck	108	2	20%
	Circular saw/cut off saw/disc cutter	115	1	5%
	Compressor	102	1	5%
	Scabbling concrete	111	1	5%
	Compaction of concrete - compressor and poker vibrator	105	2	10%
Beam Instillation and deck works.	Mobile crane (100t)	103	1	75%
	Compressor	95	2	30%
	Compaction of concrete - compressor and poker vibrator	105	2	10%
	Lorry delivery	109	2	20%
	Hiab	116	1	25%
	Pick up	102	1	30%
	Circular saw/cut off saw/disc cutter	115	1	5%
	Concrete pump	103	1	30%
	Concrete mixer truck	108	4	10%

Stage	Plant	Sound power Level (dBA)	Number (per work gang)	On time % (daily average over 1 month)
Demolition	Excavator (JCB)	97	1	50%
	Tracked loader (CAT)	112	1	50%
	Excavated material lorries	109	2	50%
	Pneumatic breaker	111	1	50%
	Compressor	102	1	50%
	Excavator mounted breaker	120	1	50%

Skippool Bridge Junction to Poulton Junction

Stage	Plant	Sound power Level (dBA)	Number (per work gang)	On time % (daily average over 1 month)
Site clearance	Excavator (30t)	103	1	60%
	Chainsaw	114	2	100%
	Chipper	118	2	100%
Earthworks	Excavator (35t)	108	1	90%
	Bulldozer (24t)	111	1	50%
	Articulated dump truck (23t)	109	4	50%
	Roller - static	108	1	50%
	Vibratory roller	108	1	90%
	Lorry delivery	109	8	90%
	Haulage dump truck being loaded	110	4	50%
Drainage	Excavator (JCB)	97	1	70%
	Excavator (15t)	101	1	70%
	Wheeled dumper (6t)	101	2	25%
	Compressor	102	1	5%
Roadworks	Excavator (20t)	99	2	70%

Stage	Plant	Sound power Level (dBA)	Number (per work gang)	On time % (daily average over 1 month)
	Excavator (JCB)	97	1	70%
	Vibratory roller	108	1	70%
	Wheeled dumper (6t)	101	1	25%
	Lorry delivery	109	3	20%
Pavement	Paver and tipper lorry	105	1	80%
	Roller - static	108	1	80%
	Lorry delivery	109	2	80%
	Compressor	102	1	5%

Poulton Junction

Stage	Plant	Sound power Level (dBA)	Number (per work gang)	On time % (daily average over 1 month)
Site clearance	Excavator (15t)	101	1	60%
	Chainsaw	114	2	100%
	Chipper	116	2	100%
Earthworks	Excavator (20t)	99	1	70%
	Lorry delivery	109	3	70%
	Roller - static	108	1	70%
	Vibratory roller	108	1	70%
Drainage	Excavator (JCB)	97	1	70%
	Excavator (15t)	101	1	70%
	Wheeled dumper (6t)	101	2	25%
	Compressor	102	1	5%
Roadworks	Excavator (20t)	99	2	70%
	Excavator (JCB)	97	1	70%
	Vibratory roller	108	1	70%
	Wheeled dumper (6t)	101	1	25%

Stage	Plant	Sound power Level (dBA)	Number (per work gang)	On time % (daily average over 1 month)
	Lorry delivery	109	3	20%
Pavement	Paver and tipper lorry	105	1	80%
	Roller - static	108	1	80%
	Lorry delivery	109	2	80%
	Compressor	102	1	5%

Poulton Junction to Lodge Lane bridge

Stage	Plant	Sound power Level (dBA)	Number (per work gang)	On time % (daily average over 1 month)
Site clearance	Excavator (30t)	103	1	60%
	Chainsaw	114	2	100%
	Chipper	118	2	100%
Earthworks	Excavator (35t)	108	1	90%
	Bulldozer (24t)	111	1	50%
	Articulated dump truck (23t)	109	4	50%
	Roller - static	108	1	50%
	Vibratory roller	108	1	90%
	Lorry delivery	109	4	90%
	Haulage dump truck being loaded	110	4	50%
Drainage	Excavator (JCB)	97	1	70%
	Excavator (15t)	101	1	70%
	Wheeled dumper (6t)	101	2	25%
	Compressor	102	1	5%
Roadworks	Excavator (20t)	99	2	70%
	Excavator (JCB)	97	1	70%
	Vibratory roller	108	1	70%

Stage	Plant	Sound power Level (dBA)	Number (per work gang)	On time % (daily average over 1 month)
	Wheeled dumper (6t)	101	1	25%
	Lorry delivery	109	3	20%
Pavement	Paver and tipper lorry	105	1	80%
	Roller - static	108	1	80%
	Lorry delivery	109	2	80%
	Compressor	102	1	5%

Lodge Lane Bridge

Stage	Plant	Sound power Level (dBA)	Number (per work gang)	On time % (daily average over 1 month)
Site clearance	Excavator (15t)	101	1	60%
	Chainsaw	114	1	25%
	Chipper	116	1	25%
Earthworks	Excavator (15t)	108	1	90%
	Lorry	109	2	90%
Temporary diversion	Excavator (20t)	99	2	70%
	Excavator (JCB)	97	1	70%
	Vibratory roller	108	1	70%
	Wheeled dumper (6t)	101	1	25%
	Paver and tipper lorry	105	1	80%
	Roller - static	108	1	80%
	Lorry delivery	109	2	80%
	Compressor	102	1	5%
Abutments	CFA crawler mounted rig	108	1	50%
	Mobile crane (55t)	98	1	50%
	Excavator (15t)	101	1	50%

Stage	Plant	Sound power Level (dBA)	Number (per work gang)	On time % (daily average over 1 month)
	Concrete mixer truck	108	2	20%
	Circular saw/cut off saw/disc cutter	115	1	5%
	Compressor	102	1	5%
	Scabbling concrete	111	1	5%
	Compaction of concrete - compressor and poker vibrator	105	2	10%
Beam installation and deck works	Mobile crane (100t)	103	1	75%
	Compressor	95	2	30%
	Compaction of concrete - compressor and poker vibrator		2	10%
	Lorry delivery	105	2	20%
	Hiab	109	1	25%
	Pick up	116	1	30%
	Circular saw/cut off saw/disc cutter	102	1	5%
	Concrete pump	115	1	30%
	Concrete mixer truck	103	4	10%
Wing walls	CFA crawler mounted rig	108	1	50%
	Mobile crane (55t)	98	1	50%
	Excavator (15t)	101	1	50%
	Concrete mixer truck	108	2	20%
	Circular saw/cut off saw/disc cutter	115	1	5%
	Compressor	102	1	5%
	Scabbling	111	1	5%

Stage	Plant	Sound power Level (dBA)	Number (per work gang)	On time % (daily average over 1 month)
	concrete Compaction of concrete – compressor and poker vibrator	105	2	10%

Lodge Lane Bridge to Grange Footbridge

Stage	Plant	Sound power Level (dBA)	Number (per work gang)	On time % (daily average over 1 month)
Site clearance	Excavator (30t)	103	1	60%
	Chainsaw	114	2	100%
	Chipper	118	2	100%
Earthworks	Excavator (35t)	108	1	90%
	Bulldozer (24t)	111	1	50%
	Articulated dump truck (23t)	109	4	50%
	Roller - static	108	1	50%
	Vibratory roller	108	1	90%
	Lorry delivery	109	4	90%
	Haulage dump truck being loaded	110	4	50%
Drainage	Excavator (JCB)	97	1	70%
	Excavator (15t)	101	1	70%
	Wheeled dumper (6t)	101	2	25%
	Compressor	102	1	5%
Roadworks	Excavator (20t)	99	2	70%
	Excavator (JCB)	97	1	70%
	Vibratory roller	108	1	70%
	Wheeled dumper (6t)	101	1	25%

Stage	Plant	Sound power Level (dBA)	Number (per work gang)	On time % (daily average over 1 month)
	Lorry delivery	109	3	20%
Pavement	Paver and tipper lorry	105	1	80%
	Roller - static	108	1	80%
	Lorry delivery	109	2	80%
	Compressor	102	1	5%

Grange Footbridge

Stage	Plant	Sound power Level (dBA)	Number (per work gang)	On time % (daily average over 1 month)
Site clearance	Excavator (15t)	101	1	60%
	Chainsaw	114	1	25%
	Chipper	116	1	25%
Earthworks	Excavator (15t)	108	1	90%
	Lorry	109	2	90%
Bases	Excavator (15t)	101	1	50%
	Concrete mixer truck	108	2	20%
	Circular saw/cut off saw/disc cutter	115	1	5%
	Compressor	102	1	5%
	Scabbling concrete	111	1	5%
	Compressor and poker vibrator	105	2	10%
Steelwork installation	Mobile crane (100t)	103	1	50%
	MEWP	106	2	25%
	Air wrench	106	2	5%
	Generator	89	1	5%
	Compressor	102	1	5%

Grange Footbridge to Windy Harbour Junction

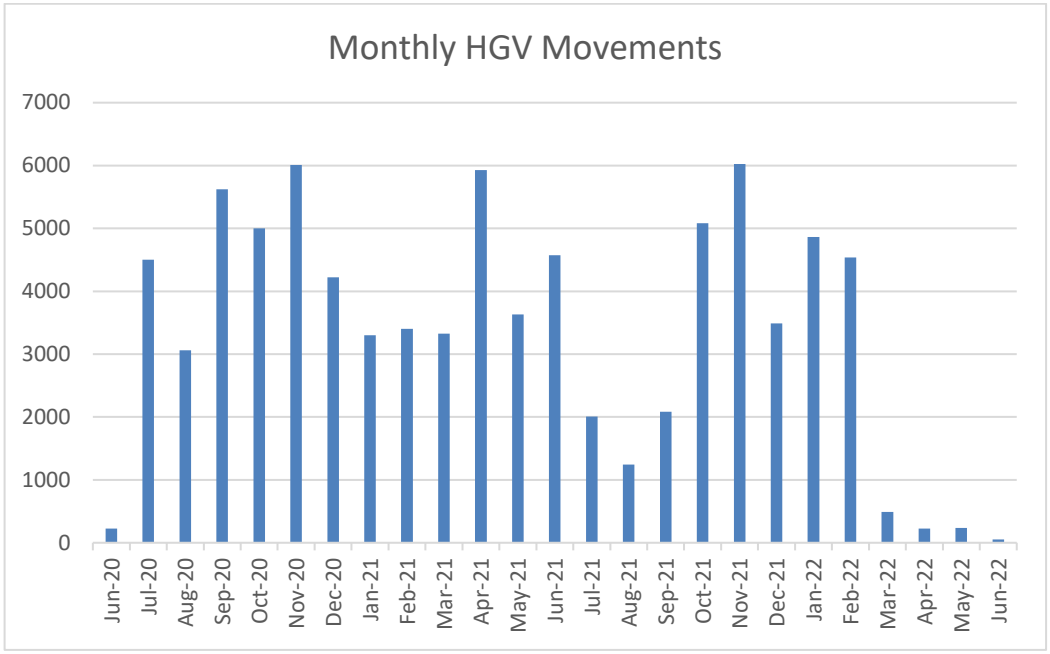
Stage	Plant	Sound power Level (dBA)	Number (per work gang)	On time % (daily average over 1 month)
Site clearance	Excavator (30t)	103	1	60%
	Chainsaw	114	2	100%
	Chipper	118	2	100%
Earthworks	Excavator (35t)	108	1	90%
	Bulldozer (24t)	111	1	50%
	Articulated dump truck (23t)	109	4	50%
	Roller - static	108	1	50%
	Vibratory roller	108	1	90%
	Lorry delivery	109	4	90%
	Haulage dump truck being loaded	110	4	50%
Drainage	Excavator (JCB)	97	1	70%
	Excavator (15t)	101	1	70%
	Wheeled dumper (6t)	101	2	25%
	Compressor	102	1	5%
Roadworks	Excavator (20t)	99	2	70%
	Excavator (JCB)	97	1	70%
	Vibratory roller	108	1	70%
	Wheeled dumper (6t)	101	1	25%
	Lorry delivery	109	3	20%
Pavement	Paver and tipper lorry	105	1	80%
	Roller - static	108	1	80%
	Lorry delivery	109	2	80%
	Compressor	102	1	5%

Utility Diversions

Stage	Plant	Sound power Level (dBA)	Number (per work gang)	On time % (daily average over 1 month)
Utilities	Vibrating roller (small)	103	1	25%
	360 excavator (15t)	101	1	50%
	Dumper (2t)	102	1	50%
	Pick up	102	1	25%
	Disc cutter	112	1	5%
	Hydraulic sheet piling	106	1	25%

Annex B – HGV Movements (Construction)

Total Monthly Vehicle Movements Across the Scheme



Vehicle movements have been calculated from the construction materials and activities envisaged at the time of the Scheme's preliminary design. These have been spread across the phased programme of works for each individual construction section. A contingency of 10% has been built into the figures for HGV movements to cover unforeseen eventualities.