

## Appendix A3.1: Construction Information

### 1 Introduction

- 1.1 This appendix provides an overview of a potential construction scenario for the proposed scheme. This information was prepared based on the proposed scheme design to provide a set of assumptions for the purposes of assessing potential construction impacts as reported in this Environmental Impact Assessment (EIA) Report.
- 1.2 It should be noted that the design of the temporary works, and the construction programme and methodology, would be determined by the appointed Contractor, within the constraints of the contract and the requirements of this EIA Report (i.e. to achieve the stated residual effects).
- 1.3 Information is set out under the following headings:
- General Site Operations;
  - Construction Programme and Phasing;
  - Indicative Construction Methods; and
  - Site Access, and Traffic Management.
- 1.4 The construction of the proposed scheme is expected to use plant that are typical for bridge refurbishment projects of this type. These include:
- excavators;
  - piling rigs;
  - tracked vehicles;
  - Heavy Goods Vehicles (HGVs) and concrete wagons;
  - concrete pumps and mixers;
  - hand-operated machinery including compacting plant;
  - portable generators for temporary lighting, pumps and similar; and
  - cranes and other lifting equipment.

### 2 General Site Operations

#### Safety and Security

- 2.1 Throughout the course of the works the Contractor would manage the Health and Safety of the site in accordance with the requirements and principles of all current applicable Health and Safety legislation, including the Construction (Design and Management) Regulations 2015, the Health and Safety at Work etc. Act 1974, the Management of Health and Safety at Work Regulations 1999, and the Workplace (Health, Safety and Welfare) Regulations 1992.

#### Working Hours

- 2.2 Falkirk Council Environmental Health Department has advised that standard construction hours for works within the Falkirk Council boundary are as follows:
- Monday to Friday: 08:00-1900;

- Saturday: 08:00-13:00; and
- Sunday: no works to be audible at the site boundary.

2.3 The above range would apply to summer hours, when it is expected to be necessary to maximise the available good weather conditions for carrying out construction activities. Winter hours would generally be shorter, due to the seasonal restriction on activities that can be carried out efficiently and the length of daylight available.

2.4 It is anticipated that some work would be required outside the normal working hours for exceptional activities (such as those that can only take place when traffic flows are low), subject to agreement with Transport Scotland, Falkirk Council and Fife Council, including:

- limited short term overnight closures of the Kincardine Bridge to allow connection of the temporary bridge to the existing bridge and subsequent removal; and
- implementing changes to temporary traffic management layouts.

#### **Site Lighting**

2.5 Temporary site lighting during construction would generally be required:

- at the Contractor's compounds for security and safe movement of staff during winter mornings and evenings;
- at locations where there is currently no lighting, but lighting is required as a safety measure under temporary traffic management; and
- for night time activities or winter afternoon activities.

### **3 Construction Programme and Phasing**

3.1 It is anticipated that construction would not commence before summer 2021 (subject to completion of statutory procedures) and the overall construction period is expected to be between 18 to 24 months.

3.2 Following the advanced works, the indicative construction phasing of construction activities is as follows:

- Mobilisation/Site establishment;
- Construction of temporary bridge structure;
- Demolition of existing piled viaduct;
- Construction of piled viaduct replacement; and
- Removal of temporary bridge structure.

### **4 Indicative Construction Methods**

#### **Mobilisation and Site Establishment**

4.1 Preliminary activities would include setting up of the site compound and material storage area to the east of the existing Sustainable Drainage System (SuDS) pond at the Higgins Neuk Roundabout. The site compound would be erected, maintained and subsequently removed in a manner to avoid or reduce impacts on the locality. The site compound would be accessed from the existing access off the Higgins Neuk Roundabout. The existing access would be widened to accommodate plant and delivery vehicles entering and exiting the site compound simultaneously.

- 4.2 A temporary access to the site from the north (Clackmannanshire Bridge) would be taken directly off the A876. This would require construction of a temporary access junction. Access to the site from the south would be from the site compound at the SuDS pond. Tracks would require to be constructed on both the north and south sides of the existing bridge and these would be formed of geotextile layer and predominantly crushed rock. The existing drainage channel that runs to the along the south side of the approach embankment would be temporarily realigned to accommodate the temporary access track and a temporary raised working platform to the north and south of the existing piled viaduct.

#### **Construction of Temporary Bridge Structure**

- 4.3 Traffic would be diverted over a temporary bridge structure adjacent to the north-west of the existing piled viaduct to facilitate the demolition and replacement of the existing piled viaduct. A minimum carriageway width of 7.3m between the kerbs would be provided to maintain two way traffic during construction, with the exception of limited periods of single lane working or full closure of the bridge for specific short term duration activities.
- 4.4 The temporary bridge structure would provide a minimum 5m clearance from the existing piled viaduct. Sheet piling or a similar protective measure would be provided during the construction of the piled viaduct replacement structure. Trackway would be installed to permit plant access to install the sheet piling.
- 4.5 Temporary construction drainage measures will be developed by the Contractor. This should comprise a closed-loop system, to ensure run-off or spillages do not enter the inter-tidal habitat surrounding the site, and should pump any collected water within excavations or isolated works to appropriate treatment facilities (likely comprising a proprietary treatment system and dosing system and supporting header tanks to store excess capacity). This system will treat surface water and dewatering as appropriate during construction of the temporary bridge structure, demolition of the existing piled viaduct, construction of the piled viaduct replacement structure and demolition of the temporary bridge structure.
- 4.6 Following the installation of sheet piling and construction of the drainage system., the temporary raised working platform to the north of the existing piled viaduct would be constructed to facilitate the construction of the temporary bridge. A geotextile layer would be placed directly on the saltmarsh before construction of the temporary working platform. The geotextile layer would be required to prevent the loss of the temporary working platform material into the saltmarsh.
- 4.7 The foundations for the temporary bridge could comprise a number of reinforced concrete pile caps at working platform level supported on concrete piles. The piles could be constructed by boring through the temporary working platform and approximately 30m to the bedrock. The construction of the temporary bridge structure would involve boring and casting approximately 90 reinforced concrete piles with rock sockets. Reinforced concrete pile caps would then be constructed on top of the piles.
- 4.8 The connection of the temporary bridge to the existing Kincardine Bridge would be made onto the existing 15m spans to the north-east of the piled viaduct. This would necessitate the removal of the reinforced concrete posts (pilasters), parapet panels, and the lamp posts between the 2<sup>nd</sup> and 5<sup>th</sup> 15m spans from the south-west to allow traffic to cross between the temporary and permanent structures.
- 4.9 The temporary bridge would be supported by a temporary support structure which could bear onto pile caps. The temporary support structure could be in the form of proprietary steel tower systems or the deck could be landed directly on bearers on the pile caps. The temporary deck could comprise a proprietary modular system.
- 4.10 Bridging plates and temporary surfacing would be installed at the tie-in between the temporary bridge structure and the existing Kincardine Bridge.

### **Demolition of Existing Piled Viaduct**

- 4.11 Whilst the remainder of the existing Kincardine Bridge would remain open to traffic during construction operations, traffic would be diverted over the temporary bridge to the north of the existing piled viaduct to allow for the demolition of the piled-viaduct and construction of the replacement structure. It is anticipated that full closure would only be required for isolated short periods to alter the carriageway alignment at the tie-in locations and could occur during night time closures to minimise disruption to traffic.
- 4.12 A temporary working platform would be constructed to the south of the existing piled viaduct. As for the temporary raised working platform to the north of the piled viaduct, a geotextile layer would be placed directly on the saltmarsh before construction of the temporary working platform.
- 4.13 The parapet panels on the existing piled viaduct would be removed and fully inspected to determine which would be refurbished. The lamp posts would be removed and stored for use on the replacement piled viaduct.
- 4.14 Demolition of the existing piled viaduct would involve the use of mechanical heavy cutting equipment such as a wire saw. Netting or some form of collection would be installed for the demolition debris. The existing substructure would be removed to a minimum of 1m below existing ground level.
- 4.15 There is a temporary propping structure below the existing piled viaduct deck consisting of steel girders, capping beams, and mini piles. The temporary propping structure would be removed during demolition of the existing piled viaduct. The Contractor would be required to develop a safe demolition sequence for the existing piled viaduct and the temporary propping structure.

### **Construction of Piled Viaduct Replacement Structure**

- 4.16 The piles to support the new structure could be constructed by boring into the working platform plus approximately 30m into the ground and the bedrock. A rock socketed bored pile with temporary casing within the superficial deposits could be used. The construction would involve boring and casting 34 reinforced concrete piles with rock sockets.
- 4.17 The existing piles could initially be cut down to a level where they could support the deck formwork. Sheet piling could be installed to form caissons around each individual pile cap and abutment base whilst the pile caps are being constructed. Formwork would be erected within the caissons to cast the pile caps and abutment base. Propping of the sheet piling may be required. The piers would then be constructed from the footings. Bespoke formwork would be required due to the geometrical shape of the reinforced concrete leaf piers which would be cast on-site (in situ). As the new superstructure is of cast reinforced concrete cast on-site (in situ), bespoke temporary falsework would be provided to support the wet concrete. This could be supported off the existing piled viaduct piles and proposed pile caps. Upon the concrete reaching the desired strength, backfilling activities would commence to the level of the parapet support slabs. These could then be constructed using conventional concreting techniques. It is anticipated that the material excavated to form the pile caps and piers would be reinstated around these elements to surface level. Aggregate material (Class 6N fill) would be placed behind the south abutment.
- 4.18 The deck would be surfaced after installation of waterproofing and kerbing. New safety barriers would be installed along the length of the piled viaduct replacement structure. On completion of the new structure, the existing 'Varioguard' safety barriers would be reinstated on the adjacent 15m spans. The reinforced concrete pilasters removed from the existing piled viaduct and from the adjacent 15m spans to accommodate connection to the temporary bridge, would be replaced with pilasters which match the design and materials of the originals. Where possible, the existing parapet panels removed from the existing piled viaduct and the adjacent 15m spans to accommodate connection with the temporary bridge will be re-erected. Where existing parapet panels are not suitable for re-erection, new parapets

which replace the existing parapets would be provided. The lamp posts removed from the existing piled viaduct and from the adjacent 15m spans to accommodate connection with the temporary bridge would be re-erected.

- 4.19 The working platform to the south of the piled viaduct replacement structure and the access track leading from the site compound would be removed.

#### **Removal of Temporary Bridge Structure**

- 4.20 Full bridge closure would be required during periods to divert the traffic over the piled viaduct replacement structure.

- 4.21 All temporary access measures provided to facilitate construction of the piled viaduct replacement structure and temporary bridge structure would be dismantled and removed on completion of construction with the piles cut down to at least 1m below ground level. The area surrounding the piles would be locally excavated, with that excavated material then reinstated as backfill.

#### **Contaminated Materials**

- 4.22 The treatment of any hazardous materials encountered during construction would comply with specific contract requirements and would require an assessment in accordance with current health and safety regulations including the Control of Substances Hazardous to Health Regulations (COSHH) Regulations 2002. Contaminated materials may have to be disposed of at licensed sites.

#### **Waste Management**

- 4.23 A Site Waste Management Plan (SWMP) will be prepared and implemented, in a manner to suit the requirements of the proposed scheme, to ensure that each potential waste stream is evaluated against the waste hierarchy (of prevention, preparing for reuse, recycling, other recovery and disposal) to derive management options that reflect the highest possible level within the hierarchy; and to plan, implement, monitor and review waste minimisation and management throughout the construction programme; and ensure compliance with duty of care requirements.

- 4.24 The SWMP is a live document, updated at varying points within the project cycle, that is used to facilitate the identification and implementation of waste prevention at the design stage and reuse, recycling and other recovery opportunities during construction, reducing the quantities of construction waste sent to landfill.

- 4.25 A Design Stage SWMP will be prepared prior to construction in order to record basic details of the proposed scheme. It will identify the person(s) responsible for the SWMP, set the reporting metrics for the proposed scheme, identify scheme targets, provide an outline estimate of the likely types of waste and quantities that will be generated during the construction of proposed scheme and record any actions taken to prevent waste during the design stage.

- 4.26 Once the Design Stage SWMP has been finalised, it will be passed to the appointed Contractor who will be responsible for discharging the remaining requirements of the SWMP process during construction, including:
- forecasting residual waste arisings before going to site (once this residual waste forecast is completed, waste management and recovery options can be implemented);
  - identifying and recording waste management and recovery actions to reduce the quantity of residual waste estimated;

- specifying waste carriers which will be employed to transport waste off site for reuse, recycling, treatment or disposal;
- identifying the sites that the waste will be taken to and confirming that the operators of those sites hold a waste management licence or registered exemption;
- updating the plan to record actual waste movements as waste is reused, recycled, recovered or disposed of; and
- where relevant, drawing on any lessons learnt, identifying any action to address these for the next scheme.

4.27 The SWMP will set out how all construction phase materials will be managed and will reference any specific materials management plans developed under relevant SEPA definition of waste guidance, end-of-waste guidance, special waste guidance, statutory guidance and position statements; and industry regulated codes of practice, including but not limited to those identified in Section 13.2 (Legislation, Policies and Guidance) of Chapter 13 (Material Assets and Waste). The SWMP will also contain the following targets applicable to the proposed scheme; that *'At least 70% of all waste to be recycled, and a maximum of 5% of waste sent to landfill'* in order to support the delivery of the Scottish Government's Zero Waste Plan Targets.

4.28 The Contractor will consult with relevant local authorities and Scottish Environmental Protection Agency (SEPA) regarding the development of the SWMP.

#### **Drainage**

4.29 A new drainage system would be installed in the proposed piled viaduct replacement. The drainage would be carried to the south end of the piled viaduct replacement structure using kerb drainage units. It is proposed that the drainage would then tie into the existing drainage network which outfalls into the existing SuDS pond located at Higgins Neuk Roundabout. The existing SuDS pond discharges to the existing open drainage channel to the south of the A985 approach to the Kincardine Bridge, which then discharges into the Forth Estuary.

## **5 Site Access and Traffic Management**

### **Access Routes for Construction Traffic**

5.1 Temporary access to the site from the north (Clackmannanshire Bridge) would be taken directly off the A876. This would require the construction of a temporary access junction.

5.2 A temporary access to the site from the south would be provided from the existing access track at the south of the Higgins Neuk Roundabout. The existing access would be widened to accommodate plant and delivery vehicles entering and exiting the site compound simultaneously.

### **Traffic Management Requirements**

5.3 During the construction period, temporary traffic management would be required to undertake the works, whilst minimising disruption to users of the active road network.

5.4 Temporary traffic management would be put in place during construction. Examples of measures include traffic cones, temporary signs and lighting, temporary speed restrictions, temporary diversions and contraflows.

- 5.5 It is proposed that two-way traffic would be maintained on the temporary bridge during construction with the exception of limited periods of single lane working or full closure of the bridge for specific short-term duration activities.
- 5.6 Where considered appropriate, the Contractor would be required to provide a vehicle recovery service to promptly remove any broken down vehicles within the temporary traffic management areas.

#### Works Restrictions

- 5.7 It is generally proposed that the majority of the construction works be undertaken within the typical working hours as set out in Section 2.2 (Working Hours). Traffic management or alternative diversion routes would be set up during any night time works to be undertaken, together with advance warning and publicity to help drivers to avoid these locations/dates if possible.
- 5.8 Road closures and diversions are likely to require a Temporary Traffic Order and be subject to approval by Transport Scotland, Falkirk Council, Fife Council, Police Scotland, and the Maintaining Authority.

#### Temporary Road Closures or Diversions

- 5.9 If required, temporary road closures and diversions would be arranged through the Overseeing Organisation following discussions with Transport Scotland, Falkirk Council, Fife Council, Police Scotland and the Maintaining Authority. A Temporary Traffic Order giving the requisite notice would be prepared and a statutory notice placed in local newspapers.

#### Approvals

- 5.10 The Contractor's detailed proposals for traffic management would only be confirmed after discussions with Transport Scotland, Falkirk Council, Fife Council, Police Scotland and the Maintaining Authority.

## 6 References

### **Reports and Documents**

SEPA (2009a). Land Remediation and Waste Management Guidelines.

SEPA (2009b) Engineering in the Water Environment Good Practice Guide: Temporary Construction Methods.

### **EU Directives and National Legislation**

Construction (Design and Management) Regulations 2015.

Health and Safety at Work etc. Act 1974 Management of Health and Safety at Work Regulations 1999.

Workplace (Health, Safety and Welfare) Regulations 1992.

Control of Substances Hazardous to Health Regulations (COSHH) Regulations 2002.

Waste Management Licensing (Scotland) Regulations 2011.