

# EWR Alliance

**Title: Culvert and Drainage Construction Method Statement**

**Document Number: 133735-EWR-CNT-DEL-000002**

**Date: February 2020**



# East West Rail Phase 2

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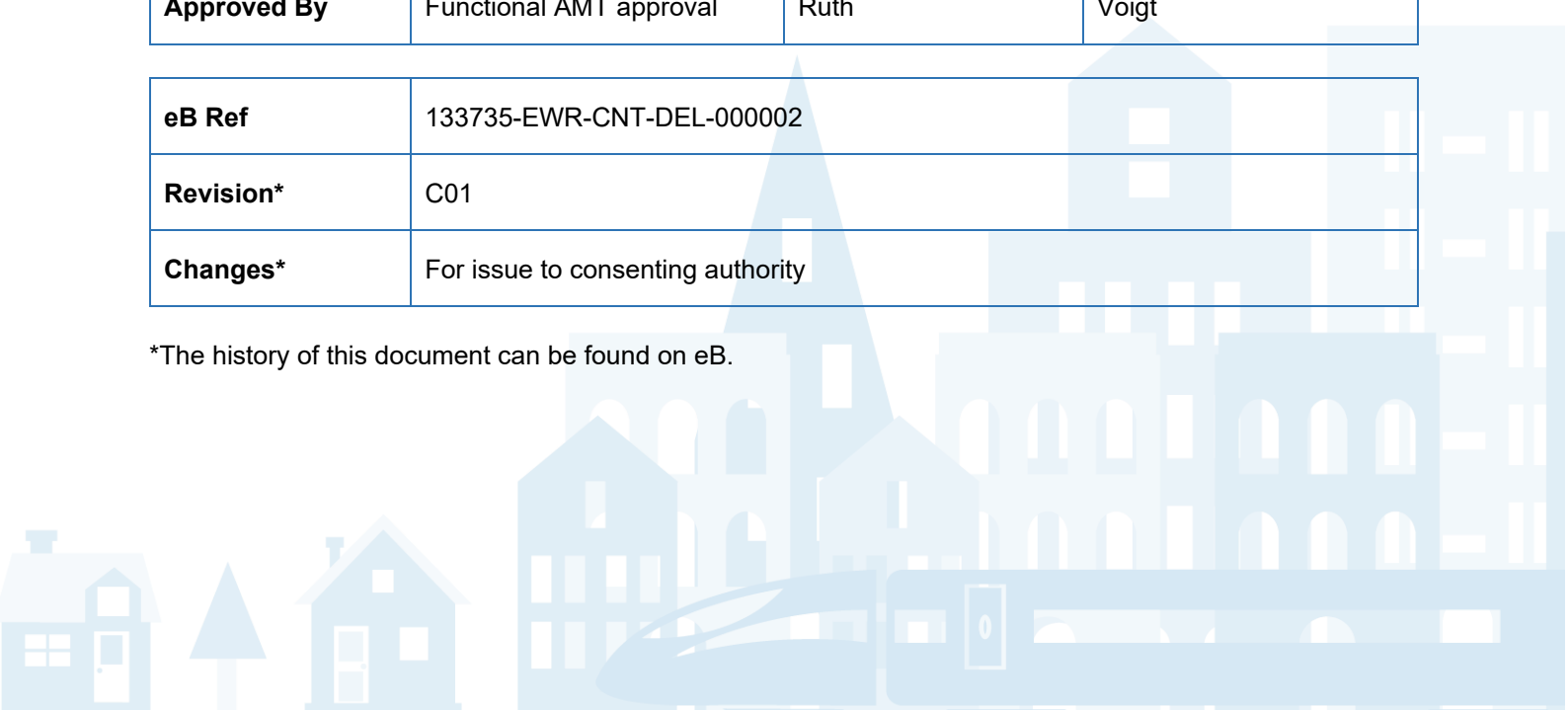
### Document History

QR Code

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<b>eB Ref</b>	133735-EWR-CNT-DEL-000002
<b>Revision*</b>	C01
<b>Changes*</b>	For issue to consenting authority

\*The history of this document can be found on eB.



# 1. Introduction

The following document sets out the proposed methodology for constructing new and amending/renovating existing culverts and drainage assets within 10m of a watercourse as part of the permanent works for the East West Rail Alliance Phase 2 project. The following measures take account of general ecological constraints and reflect a need to maintain water quality in existing watercourses during the both construction and renovation of these culvert and drainage assets.

# 2. Construction Method

There are a number of factors that will dictate the method in which the culverts are to be constructed, these being:

1. Time of year
2. Size (diameter, length), material and depth of culvert
3. Flow volumes passing through the culvert
4. Culvert design, bed and surround details
5. Installation of new culvert or renovation of existing culvert

## 2.1 Offline Construction of Culverts

Where it has been possible the new culverts have been designed to be constructed 5-10m offline from the existing culverts. The methodology below will be followed for the construction of offline culverts.

1. Where we are to construct a new culvert away from an existing culvert this will be undertaken by installing interlocking sheet piles on the edge of the existing watercourse where the headwalls are to be placed. These will prevent the watercourse washing into the working area during excavation as well as minimizing the risk of silt entering the watercourse. Prior to commencing the installation of the sheet piles silt control measures; full width silt curtain or a series of staggered silt screens, will be installed downstream.
2. The extents of the excavation shall be marked out to include for the width of the permanent works and to take into account for the width of any temporary works (such as trench boxes or sheet piles and bracing frames).
3. An excavator shall commence excavating the material in layers of approximately 300-500mm in depth and depositing this into dumpers which will remove the spoil from the work area and off site for either disposal or use on another part of the works subject to its suitability.
4. The depth of the excavation will be monitored and checked with an engineer either using a level and staff or profile boards and a traveller.
5. Upon reaching the invert of the excavation, the bed for the culvert will be laid. This will consist of either well graded granular material or reinforced concrete.
6. The granular material bed will be laid and then the culvert sections (either pipe or box/rectangular sections) will then carefully be lowered into position. This process will continue with the next pipe/section being carefully lowered into the trench and then either pushed or pulled "home" to make a seal by using hydraulic jacks, the use of the excavator pushing on a large timber chock or by pulling together with lifting straps and a block and tackle. The joint between the pipes is a rubber gasket and the joints between culvert box/rectangular sections is with tokstrip and primers. These need to be carefully checked prior to jointing to ensure no stones or debris is in the joints which may prevent a watertight joint.
7. Once a couple of pipes/sections have been laid they will then be backfilled to provide stability and prevent them from moving as well as allowing parts of the excavation to be backfilled with the appropriate material and compacted accordingly.

8. Where the pipes are to be laid on a reinforced concrete bed, the above process from steps 1 to 5 will be completed.
9. A concrete blinding layer of 75-100mm thick will firstly be laid to ensure a sound base can be worked from and to enable the tying of the steel re-bar to be undertaken. Depending upon the design and number of members in the re-bar cage it may be easier to fabricate this away from the work area and then bring to site and lift and lower into the trench to suit.
10. Once in place, the concrete shall then be brought to site and carefully placed in a controlled manner to form the base/bed slab.
11. Once the base/bed slab has been allowed to cure for a 1 to 2 of days, the culvert pipes/culvert sections will then be carefully lowered into the excavation into their designated position.
12. This process will continue as detailed above in step 6 until a number of pipes/sections have been laid and jointed.
13. Depending upon the design detail for the surround of the pipe/sections, the re-bar cage will then be tied around and shuttered off accordingly. Where the concrete is to be poured to the extents of the excavation then plastic sheeting shall be placed against the sheet piles or trench box so that they can be easily removed the following day.
14. Concrete shall be brought to site and carefully placed around the pipe/sections, as per step 10 to the required fill level. During the placement of the concrete a concrete poker will be used to expel air and ensure that the concrete fills all around the culvert and rebar.
15. The above process will continue from steps 11 to 14 until all sections have been laid.
16. Upon completion of laying the main sections of pipe the rocker pipes will then need to be laid, one at either end of the pipe run. These will be laid and jointed as in step 6.
17. The installation of the headwalls to the ends of the culverts will be made and these headwalls are all prefabricated. The headwall will need to sit on a 150mm bed of dry lean concrete, so the area for this shall be excavated by hand or machine to the required profile and fill with the 150mm thick layer of dry lean.
18. The headwalls shall then be carefully lowered into position by use of an excavator with appropriate lifting equipment and under a controlled lift plan. Once in position the headwall shall be braced in position and grouts/sealants used to make the joint between the culvert and the headwall watertight.
19. The headwalls should be delivered to site with the handrails fixed to them, if this is not the case then the handrails will be fixed to the headwalls prior to lifting it into position, providing they don't impinge upon the location of the lifting equipment.
20. Once the headwalls have been installed the construction of the scour protection will be laid to form the channel bed.
21. Upon completion of the installation of the scour protection, the sheet piles shall be carefully and slowly removed to allow the flow from the channel through the new culvert. The sheet piles at the outfall will be removed first and then the piles at the upstream end will be removed allowing flows to pass through the new culvert and existing culvert. Silt screens will be installed within the watercourse downstream of the outfall.
22. Sand and or ballast bags or sheet piles shall then be placed in the channel at the interface with the old culvert to stem flows from passing through it. The culvert shall then be carefully removed. Upon completion of the removal of the old culvert, the excavation shall be carefully backfilled and compacted with suitable material prior to the removal of the sand/ballast bags or sheet piles. Cleaned stone / sand will be used to prevent the washing of fines into the watercourse. Downstream silt control measures will remain in place until all works are complete.

## 2.2 Online Construction of Culverts

There are locations across the East West Rail Phase 2 where the culverts are to be renovated and new culverts constructed online. The methodology below will be followed for works to be completed online. Further details on pumping arrangements are given in the Environmental Management section of this method statement.

1. A temporary dam will be constructed upstream of the works using sand bags, sheet piles or a proprietary bunding solution. A second dam will be constructed downstream of the construction area of the culvert installation. The flow within the watercourse will be pumped from behind the temporary upstream dam and discharged on the downstream side of the works.
2. The pump inlets will be screened to prevent intake of fish or other aquatic animals. The damming of the watercourse will be supervised by a suitably qualified aquatic ecologist who will undertake fish rescue, where required.
3. Once both dams have been installed, the area between the dams will be dewatered of any residual water using sump to enable works to proceed in the dry. If the water is turbid from disturbance caused by installation of the dams, the water will be pumped to a temporary settlement tank. If the water inside of the dams appears to be in the same condition as the upstream flow it will be pumped directly to the downstream discharge point.
4. A pump will be placed in the work area to catch and remove any water accumulating through the dams. This water will be passed through the temporary settlement tank prior discharge.
5. Installation of the culvert will proceed as outlined from step 3 of the offline construction method.
6. Upon completion of the installation of the scour protection, the dams shall be carefully and slowly removed to allow the flow from the channel through the new culvert. The downstream dam will be removed first to allow the culvert to partly fill and then the dam at the upstream end will be removed allowing flows to pass through the new culvert.

## 2.3 Construction of the outfall within the banks of a watercourse

Where a proposed drainage system requires a new outfall to be constructed into the receiving watercourse, the following methodology will be followed to reduce the risk of polluting incidents:

1. The installation of drains will typically start from the outfall and work towards the head of the drainage run. No discharges from the drainage system shall be made into the watercourse until the principal on-site measures to attenuate flows and remove sediment are in place and functional; this will be achieved through the use of a temporary stopper (vetta stopper or similar) within the bore of the pipe. Water collected within the drainage system or from temporary works will be pumped and treated using a sediment trap prior to being discharged to the watercourse.
2. To enable construction of the headwall in a dry environment either:
  - a. flows in the receiving watercourse (if present) will be managed by blocking off with sand bags, or equivalent, and over pumping (further details on pumping arrangements are given in the Environmental Management section of this method statement); or
  - b. the area for the headwall will be sealed off from the watercourse with interlocking sheet piles. Efforts will be made to ensure that prior to the sheet piling works that if the water channel requires widening (to allow for narrowing during the sheet piles) that this is completed in advance.
3. A 360° mechanical excavator will be used to excavate and level the foundation of the headwall. To do this the excavator will be located at the top of the bank and not in the watercourse.
4. To prevent silt entering the watercourse during construction of the outfall, temporary silt barriers will be installed between the watercourse and the excavation.
5. The formation of the headwall will be on a concrete bed.
6. Where grouting/cementing precast element joints is required, the grout will be mixed in small quantities away from watercourse and then placed carefully by hand.
7. Scour protection shall be installed between the headwall and the watercourse using an excavator from the top of the bank. Final levels will be achieved using hand tools in accordance with the associated drainage design.

8. Finished levels around the headwall shall be graded and trimmed to tie-in with existing ground levels. Adjacent areas will be reinstated to original condition.

## 3. Environmental Management

The following principles are to be applied during construction and renovation of the culverts and drainage assets for all works within 10m of a watercourse. EWR Alliance will comply with the Code of Construction Practice and the Environmental Incident Response Plan.

### 3.1.1 General Arrangements

1. Prior to commencement a survey of the working area will be undertaken as a minimum to record:
  - the location, form and condition of existing drainage features and
  - the existing watercourse channel (bed and banks). This will inform requirements for reinstatement.
2. For all construction compounds and areas of the proposed works located within areas deemed to be at risk of fluvial and surface water flooding, the EWR Alliance shall prepare and implement a Flood Emergency Response Plan (FERP) during the construction phase. The FERP will include, where relevant:
  - Arrangements to evacuate the area at flood risk
  - Arrangements to make safe any static plant
  - Arrangement to move any mobile plant
3. EWR Alliance has signed up to the EA Flood Warnings Direct scheme and MET Office weather alerts as well as regularly monitoring weather forecasts when planning all construction activities.
4. In the event of notification of high flows any items with the potential of escaping will be secured and/or removed from the proximity of the watercourse to reduce the risk of causing damage to the watercourse or any other structures downstream
5. Where possible, works will be planned for the summer months to be completed during periods of lowest flow.
6. All excavations shall be fenced off prior to any excavation commencing.
7. Removal of vegetation will be limited to that required for construction.
8. Excavated material that is not able to be reused within the works will be removed immediately from the working area and taken away for storage for reuse elsewhere on the project, if suitable.
9. Excavated material that can be reused as part of these works will be stored in a designated stockpile area located outside of the local pluvial and fluvial flood zones, where possible, until reuse.
10. At the end of each working day, trenches and excavations shall preferably be backfilled where it is practicable to do so, where this is not possible they will be safely and securely fenced off to prevent unauthorized access.

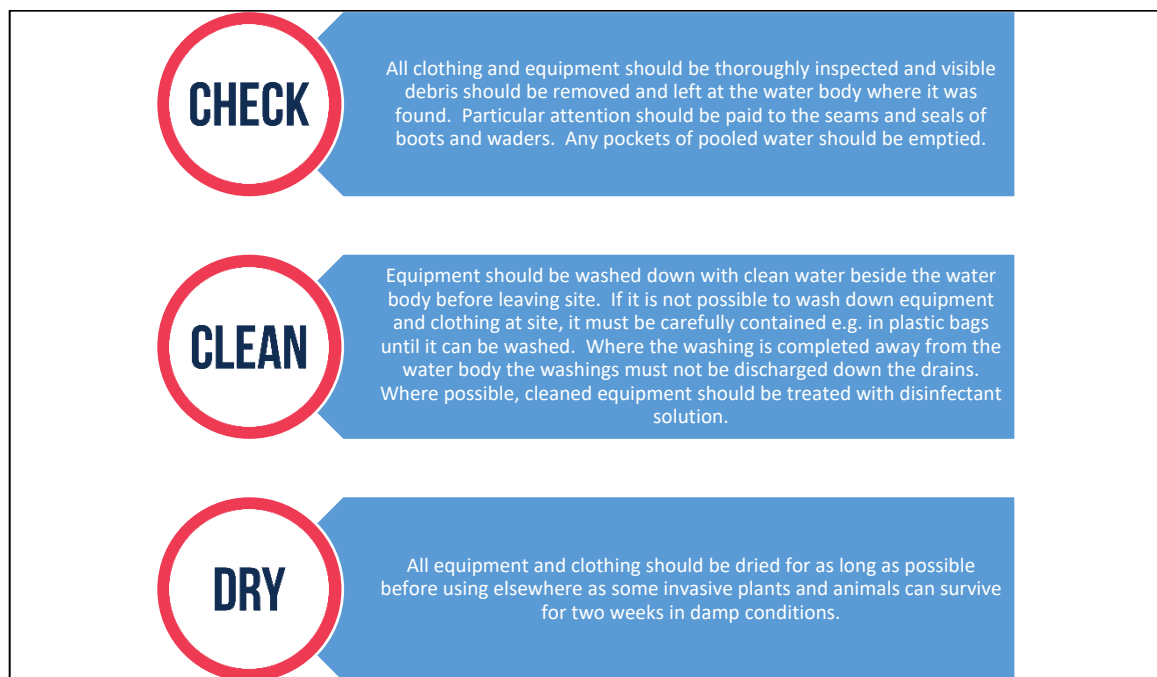
### 3.1.2 Pollution Prevention Measures

1. No fuel or chemicals will be stored within 10m of a watercourse. All products will be held within suitable containers that are fit for use and all containers will either have integral secondary containment or will be placed within secondary containment.
2. Where possible, biodegradable lubricants and hydraulic oils will be used within the in use machinery.
3. Refuelling shall be undertaken in designated areas away from the watercourse, by a trained site representative and will utilise a double bunded bowser, funnels and drip tray or equivalent.

4. Spill kits that are appropriate in type and quantity for the works shall be kept at site at all times; an oil absorbent boom sufficient for the width of the watercourse shall form part of the available spill kits.
5. During out of hours no plant or equipment will be left within 10m of the watercourse.
6. Where possible, concrete will be delivered to the works to avoid the need for onsite mixing. Where the concrete must be prepared onsite it will not be mixed within 10m of a watercourse on an impermeable surface.
7. Prior to pouring concrete all shuttering will be checked to confirm it is fit for use. In the event of a failure in the shuttering the concrete pour will be stopped and the concrete removed to prevent it migrating from the works area.
8. Concrete washout waters will be captured; depending on site conditions either a concrete washout treatment system will be positioned and passed through a treatment system or sent for offsite disposal.

### 3.1.3 *Biosecurity*

Spread of disease and non-native species between waterbodies will be managed in accordance with the Check, Clean, Dry campaign:



### 3.1.4 *Ecological Arrangements*

Prior to these works commencing the terrestrial protected species present along the East West Rail Phase 2 route will have been translocated from the working areas. Where required, works will be completed under Protected Species Licence from Natural England. An appropriately qualified Ecological Clerk of Works shall oversee the completion of the works at each asset location.

The following general mitigation measures shall be put in place to protect against impacts to wildlife:

1. No night-time working will be undertaken, works will commence at least 30 minutes following sunrise and will cease 30 minutes prior to sunset unless otters are known to be present. In locations with otter presence the period will be increased to one hour.
2. Any vegetation clearance, if required, will be initially cut to 150 mm to check for presence of reptiles. If hibernating or torpid reptiles have been found and relocated, and active reptiles have



been allowed time to disperse outside the works area or moved out of the works area by the Ecologist, the vegetation can then be cut down to ground level.

3. Each worksite, including the access route, will be checked for any new badger setts immediately prior to any works commencing.
4. Any excavations should be covered overnight or incorporate creation of sloping escape ramps (mammal ladders) for badgers (and other mammals potentially using the site), which may be achieved by edge profiling of trenches/excavations.
5. All great crested newt or reptile exclusion fencing within the vicinity of the work sites will be maintained at all times throughout construction.
6. Appropriate measures for the treatment/removal of known invasive, non-native species (both plants and animals) and injurious weeds will be implemented prior to the commencement of works to prevent the accidental release or spread as a result of the works. Any invasive or injurious identified during works will be excluded and a treatment/removal solution will be put in place.

### 3.1.5 *Pumping Arrangements*

1. No pumping operations will commence without an authorised EWR Alliance Permit to Pump in place.
2. The pumping activity will be subject to a minimum of twice daily monitoring. A photographic record should be taken on each check. In addition, each check shall confirm:
  - Quantity of the water before and after pumping
  - Equipment and layout are functioning effectively
  - Condition and suitability of the filtration arrangements

More frequent monitoring may be specified depending on the sensitivity of the works locations or to comply with the requirements of any consents.

3. The pump inlet will be protected and the inlet hose(s) will either be raised above the bed of the watercourse or a sump will be created within the temporary dam to ensure that the inlet hose(s) do not disturb silt nor draw in any aquatic ecology or other debris. If required, the sump will consist of a length of HDPE pipe, wrapped in geotextile, being placed vertically into the sump and backfilled around the outside with granular material.
4. The discharge point and pump rate will be selected to avoid disturbance of the watercourse bed or bank to minimise the risk of erosion; the maximum discharge rate will be set with consideration to the normal rate of flow for the watercourse.
5. Scour protection will be installed at the discharge point.
6. The pump outlet will be fitted with a sediment filter or equivalent to capture any sediment that does become drawn in.
7. A series of offset silt screens; not extending the full width of the watercourse, will be positioned downstream of the discharge point to further protect the watercourse in the event the upstream silt and debris control measures fail.
8. A secondary pump will be available at all times to ensure pumping operations can continue in the event of a pump failure or change in the watercourse levels / flow rate.

### 3.1.6 *Emergency Response*

1. An Incident Response Plan will be included in within the CEMP, which will include the process to be followed for a pollution incident.
2. The EWR Alliance will report all major pollution incidents in accordance with the Incident Response Plan.



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