

# **A1 in Northumberland: Morpeth to Ellingham**

**Scheme Number: TR010041**

## **6.1 Environmental Statement Appendix 2.3 Culvert Construction Methodology**

APFP Regulation 5(2)(a)

Planning Act 2008

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

June 2020

Infrastructure Planning

Planning Act 2008

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

**The A1 in Northumberland: Morpeth to Ellingham  
Development Consent Order 20[xx]**

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**Environmental Statement**

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<b>Regulation Reference:</b>	APFP Regulation 5(2)(a)
<b>Planning Inspectorate Scheme Reference</b>	TR010041
<b>Application Document Reference</b>	TR010041/APP/6.1
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Rev 0	June 2020	Application Issue

## **Culvert Construction Methodology**

### **A1 in Northumberland: Morpeth to Ellingham**

## **Part A: Morpeth to Felton**

## A1M2F-Environmental Assessment

### Culverts Construction Methodology-Revision 1

Dated-5<sup>th</sup> November 2018

Highways England-WSP-Morgan Sindall

#### Introduction

This methodology statement provides an outline methodology for culvert construction works on A1 Morpeth to Felton. There are a series of existing culverts on the scheme which require extensions or replacements to accommodate the on line widening works, and a number of new culverts to accommodate the offline new highway construction. There also exist the requirement for a number of culverts beneath access tracks and farm accesses.

The culvert extensions and new builds will be precast concrete box sections, precast concrete pipe sections or precast concrete arch structures. The precast culverts vary in dimension up to a maximum 4m span, the precast concrete culvert pipe sections vary in dimension from 0.45m to 1.8m diameter, and the pre-cast arch sections are of span 6.1m. The culverts may also be provided with scour protection, mammal shelves and natural beds where required. Whilst the majority of the culverts are for purposes of management of water flows through the scheme, some serve the purpose of mammal crossing points.

#### Programme and Locations

The following extract from the A1M2F culvert schedule identifies the locations, construction details and the periods within the construction programme when culvert works are to be carried out:

**CULVERT LIST FOR A1 M2F**

No.	Hydraulic Model Ref	STRUCTURE NAME (from South to North)	LOCATION PLAN	STRUCTURE TYPE	PREFERRED OPTION	Proposed Dimensions	Length	Environment			Construction		
								Scour Protection	Fish Passage	Mammal Passage	Inlet Invert level	Shape	Outlet Invert level
1	3	Paradise Culvert		Existing structure, 20° skew to be extended on the inlet (west) side.	Demolition and reconstruction using precast concrete pipe.	1.8m internal diam.	32.7m	Required	150 natural bed	Wildlife ledge with top level 950mm above pipe invert level	83.69	Circular	83.51
2	4	Priest's Bridge Culvert		New structure with 4.00m clear span.	Precast concrete box culvert.	Span: 4m Internal height: 3.75m	53m	Not required	100mm natural bed within 250mm low flow channel	500mm wide Shelf fixed to culvert 1.31m above culvert invert	79.17	Rectangular	79.08
3	6.2	Causey Park Culvert		New structure 3.0m clear span.	Precast concrete box culvert.	Span: 3.0m Internal height: 2.1m	36.2m	Required	150mm Natural bed	Wildlife ledge with top level 950mm above culvert invert level	77.16	Rectangular	76.89
4	10.1	Burgham Culvert		Existing in-situ concrete arch structure without headwalls and wingwalls, 30° skew, 3.45m internal headroom and 4.85m clear span.	Wing walls and headwall hence an extension is not required.	Remain as it is: Span: 5m Internal height: 3.45m	30.6m		Existing baffles to be replaced with GMS	New mamal ledge proposed	54.31	(irregular)	54.31
5	12	Bockenfield Culvert		Existing masonry arch structure, 14° skew, 6.1m maximum span. To be extended on the inlet side.	Precast arch concrete extension.	Remain as it is: Span: 6.1m Internal height: 2.49m	34.4m extension (total length 64.4m)	Required	Natural Bed to be maintained	Wildlife ledge with top level 1.7m above channel invert level	51.11	Arch	51.1
6	14	Glenshott Culvert		Existing circular concrete pipe, 35° skew and 1.22m internal diameter. To be extended on the outlet (east) side.	Precast concrete pipe extension.	Internal diameter: 1.35m	23.3m extension (total length 47.6m)	Required	Not included - existing culvert	Free passage available except when in flood - Existing culvert with insufficient cover to provide separate culvert	57.7	Circular	57.53
7	16	Parkwood Culvert		Existing circular concrete pipe, 35° skew and 1.22m internal diameter (inlet side) and 0.88m diameter (outlet side). To be extended on the outlet (east) side. The outlet incorporates a second pipe 0.30m diameter (?).	New deep manhole to replace existing + extension of downstream pipe with new 900mm pipe (approx. 20m)	Internal diameter: Inlet 1.2m, outlet 0.9m.	20m extension (total length 145m)	Required	Not included in upstream section as this is an existing culvert. 150mm natural bed allowed in downstream culvert replacement.	Free passage available except when in flood - Existing culvert is adjacent to Parkwood subway/underpass which provides access under highway	39.15	Circular	37.74

**ADDITIONAL CULVERTS ON M2F**

Proposed Structure Name	Watercourse name (from South to North)	Chainage	Description	Discipline	Proposed Dimensions	Length	Environment			Construction		
							Scour Protection	Fish Passage	Mammal Passage	Inlet Invert level	Shape	Outlet Invert level
West Cotting Burn Culvert	1.4	10800	Existing 450mm diameter pipe to be removed. New precast box culvert 2.7m x 1.25m to replace it.	Bridges team	Internal span: 2.70m Internal height: 1.25m	12.8m	Not Required	250mm Natural Bed	Not included - Private means of access so low risk of casualty	85.64	Rectangular	85.64
East Cotting Burn Culvert	1.5	10800	Removal of 2 existing culverts. One new precast box culvert 3.0m x 1.2m to replace them.	Bridges team	Internal span: 3.0m Internal height: 1.2m	12.8m	Not Required	200mm Natural Bed	Not included - Private means of access so low risk of casualty	85.49	Rectangular	85.49
Shieldhill Culvert	1A	11815	Existing culvert to be removed. (Leave culvert in to manage the flow). New 1.2m pipe culvert (and scour protection) then switch the flow and remove the old culvert.	Flooding Team	Internal diameter: 1.2m	43.4m	Required	150mm Natural bed	600mm dia. wildlife culvert see 1b	104.4	Circular	103.77
Wildlife Shieldhill Culvert	1B	11810	Proposed 0.6m pipe wildlife culvert.	Flooding Team	Internal diameter: 0.6m	40m	N/A	N/A	See 1a	105.29	Circular	105.16
Priest's Bridge	4.1	14020	Existing culvert. New baffles fixed to culvert to improve fish passage.	Flooding Team	Masonry Arch spanning 3.7m	34m				79.11	Irregular	78.7
North Fenrother Burn Culvert	5.2	15000	Existing 5.1 pipe culvert to be removed. 2 No. new 1.5m x 1.25m precast box culverts to be constructed.	Bridges team	Internal span: 1.5m Internal height: 1.25m	33.1m	Required	250mm Natural Bed	Separate wildlife culvert located away from watercourse	87.69	Rectangular (twin)	87.69
South Fenrother Burn Culvert	5.3	14900	New 3m x 1.75m precast box culvert to be constructed.	Bridges team	Internal span: 3.0m Internal height: 1.75m	52.7m	Not Required	250mm Natural Bed	Separate wildlife culvert located away from watercourse	87.69	Rectangular	87.56
Wildlife Fenrother Culvert	5.4	14930	Proposed 0.6m pipe wildlife culvert.	Flooding Team	Internal diameter: 0.6m	36m	N/A	N/A	see 5.3	89.98	Circular	90.49
Earsdon Burn Culvert	6.3	17000	Proposed 3m x 2.1m precast box culvert.	Bridges team	Internal span: 3m Internal height: 2.1m	11m	Required	150mm Natural bed	Wildlife ledge with top level 1000mm above culvert invert level	77.87	Rectangular	77.87
New Houses Farm Culvert	7.1	17150	Proposed 1.6m pipe culvert with 2 manholes @49m and @98m for access.	Bridges team	Internal diameter: 1.6m	148m	Not Required	Not included - insufficient baseflow	Not included - Culvert is provided to convey water through earthworks therefore no highway above and no risk of casualty	77.42	Circular	77.31
Little Causey Park Culvert	7.2	17440	Proposed 1.6m pipe culvert under PMA	Bridges team	Internal diameter: 1.6m	9m		Not included - insufficient baseflow	Available except in flood conditions - culvert is provided to convey water beneath a private means of access so low risk of casualty	77.85	Circular	77.8
Wildlife Causey Park Culvert	8.1	17660	Proposed 600mm pipe wildlife culvert.	Flooding Team	Internal diameter: 0.6m	46.4m	N/A	N/A	600mm culvert	78.367	Circular	77.619
Tiny Causey Park Culvert	8.2	17720	Proposed 0.6m piped culvert under PMA	Flooding Team	Internal diameter: 0.6m	TBC - Approx. 6m	N/A	N/A	600mm culvert	77.16	Circular	77.063
Wildlife Eshott Burn Culvert	8A	18300	Wildlife crossing point. Need a minimum 1500mm pipe to enable wildlife and preferably bats to cross.	Bridges team	Internal diameter: 1.5m	51m	N/A	N/A	1500mm culvert	77.103	Circular	77.385
South Longdike Culvert	9.1	19090	A 1.2m diameter pipe culvert.	Flooding Team	Internal diameter: 1.2m	39m	Not Required	Not included - surface water flow path	Free passage available except when in flood	67.136	Circular	67.096
Wildlife Burgham Culvert	10A	19520	1 no. Amphibian precast box culvert	Flooding Team	Internal span 0.9m Internal height 0.6m	19.8m	N/A	N/A	900x600mm rectangular culvert	56.57	Rectangular	55.93
Blackwood Hall Culvert	13.1	20880	3 No. 0.45m pipe culvert.	Flooding Team	Internal diameter: 3x0.45m	56m	Required	Not included - field drainage	Free passage available except when in flood. Depth of cover insufficient to provide separate culvert	60.487	Circular	60.19

### Online Culvert Extensions Methodology-Pipes

It will be advisable to carry out the extension works whilst the flows through the culvert are diverted to an alternative route. This may be an adjacent culvert, pipe or drainage channel. If this is not possible, a temporary sump shall be excavated on the upstream end of the existing culvert, and with the culvert dammed, a 6 inch pump will divert the flow through the culvert by means of a 6 inch pipe suspended above the culvert floor.

Culvert extension works may now proceed free of flowing water-It must be noted that in times of flood, the temporary pumping arrangement may need to be suspended and flows allowed to again flow through the culvert, suspending construction works for this period.

The culvert bed shall be excavated to formation level and a layer of blinding concrete placed.

The pipe sections shall be lifted into place with a large tracked excavator and the pipe sections pulled together ensuring the proprietary seals between the units is in place. The installation shall be carried out sequentially, ensuring correct vertical and horizontal alignment is maintained. On completion of the pipe installation, the external faces shall be waterproofed and concrete protection placed where detailed. They will then be backfilled and compacted with 6N granular material. The wing walls will then be constructed in in situ concrete, following which waterproofing and backfilling of these walls may proceed. The rip rap /scour protection, to the approaches and departures of the culvert shall then be installed and levelled to the required profiles. Any natural beds and mammal shelves will be placed through the culvert

The watercourse may then be diverted through the new culvert, allowing road construction and demolition activities to proceed.

### Online Culvert Extensions Methodology-Precast Arch sections

It will be advisable to carry out the extension works whilst the flows through the culvert are diverted to an alternative route. This may be an adjacent culvert, pipe or drainage channel. If this is not possible, a temporary sump shall be excavated on the upstream end of the existing culvert, and with the culvert dammed, a 6 inch pump will divert the flow through the culvert by means of a 6 inch pipe suspended above the culvert floor.

Culvert extension works may now proceed free of flowing water-It must be noted that in times of flood, the temporary pumping arrangement may need to be suspended and flows allowed to again flow through the culvert, suspending construction works for this period.

The culvert bed shall be excavated to formation level and a concrete ground beams to support the arch sections placed...

The arch sections shall be lifted into place with a large tracked excavator or mobile crane and the sections pulled together ensuring the proprietary seals between the units are in place. The installation shall be carried out sequentially, ensuring correct vertical and horizontal alignment is maintained. On completion of the arch installation, the external faces shall be waterproofed and concrete protection placed where detailed. They will then be backfilled and compacted with 6N granular material. The wing walls will then be constructed in in situ concrete, following which

waterproofing and backfilling of these walls may proceed. The rip rap /scour protection, to the approaches and departures of the culvert shall then be installed and levelled to the required profiles. Any natural beds and mammal shelves will be placed through the culvert

The watercourse may then be diverted through the new culvert, allowing road construction and activities to proceed.

#### Offline New Culvert Construction Methodology-Precast Concrete Box sections

Prior to commencement of the works, the flow of the open burn channel shall be diverted to an alignment approx. 10m North or South from the route of the proposed culvert construction into a preformed open channel to allow the works to be carried out free of flowing water.

The culvert bed shall be excavated to formation level and a layer of blinding concrete placed. Following this, a sand screed shall be placed to the underside of precast culvert section level.

The culvert sections shall be lifted into place with a mobile crane or large tracked excavator and the sections pulled together ensuring the proprietary seals between the units is in place. The installation shall be carried out sequentially, ensuring correct vertical and horizontal alignment is maintained. On completion of the culvert unit installation, the external faces shall be waterproofed and concrete protection placed where detailed. They will then be backfilled and compacted with 6N granular material. The wing walls will then be constructed in in situ concrete, following which waterproofing and backfilling of these walls may proceed. The rip rap/scour protection to the approaches and departures of the culvert shall then be installed and levelled to the required profiles. Final natural bed installation and any mammal shelf installation required will complete the works.

The watercourse may then be diverted through the new culvert and the temporary open course backfilled with suitable material, allowing road construction and demolition activities to commence.

#### Offline New Culvert Construction Methodology-Pipe sections

Prior to commencement of the works, the flow of the open burn channel shall be diverted to an alignment approx. 10m North or South from the route of the proposed culvert construction into a preformed open channel to allow the works to be carried out free of flowing water.

The culvert bed shall be excavated to formation level and a layer of blinding concrete or pipe bedding placed.

The pipe sections shall be lifted into place with a large tracked excavator and the sections pulled together ensuring the proprietary seals between the units is in place. The installation shall be carried out sequentially, ensuring correct vertical and horizontal alignment is maintained. On completion of the pipe unit installation, the external faces shall be waterproofed and concrete protection placed where detailed. They will then be backfilled and compacted with 6N granular material. The wing walls will then be constructed in in situ concrete, following which waterproofing and backfilling of

these walls may proceed. Any rip rap/scour protection to the approaches and departures of the culvert shall then be installed and levelled to the required profiles. Final natural bed installation will complete the works.

The watercourse may then be diverted through the new culvert and the temporary open course backfilled with suitable material, allowing road construction and any demolition activities to commence.



## **Culvert Construction Methodology**

### **A1 in Northumberland: Morpeth to Ellingham**

## **Part B: Alnwick to Ellingham**

**A1A2E-Environmental Assessment**  
**Culverts Construction Methodology-Rev 1**  
**Dated-9<sup>th</sup> December 2019**  
**Highways England-WSP-Morgan Sindall**

**Introduction**

This methodology statement provides an outline methodology for culvert construction works on A1 in Northumberland: Alnwick to Ellingham. There are a series of existing culverts on the Scheme which require extensions or replacements to accommodate the online widening works, and the installation of a new culvert.

The culvert extensions and new builds will be either precast concrete box sections or precast concrete pipe sections. The precast culverts vary in dimension up to a maximum 3m span whilst the precast concrete culvert pipe sections vary in dimension from 0.6m to 1.2m diameter. The culverts may also be provided with scour protection and natural beds where required and also the installation of wing walls at outlet and inlet.

**Locations and Culvert Forms**

The following extract from the A1A2E culvert schedule identifies the locations, construction types and details of the proposed culverts on A1 in Northumberland: Alnwick to Ellingham:

Name	Hydraulic Model Ref	STRUCTURE >900mm	CHAINAGE	LOCATION PLAN	Proposed Works	Comments
Denwick Burn (17.1)	1.1 N		53470		Existing culvert to be retained	Insufficient depth of cover to provide separate wildlife culvert (note - no modifications to existing culvert). Circular 500mm diameter, 49.95m length
Denwick Burn (18.1)	2.1 N		53850		No Work Existing Culvert to be retained	Insufficient depth of cover to provide separate wildlife culvert (note - no modifications to existing culvert). Outlet diameter is measured as less than inlet diameter, suggesting a contraction somewhere along pipe.
Denwick Burn (19.1)	3.1 N		54080		Extension of existing culvert with new 600mm dia. pipe and manhole downstream to tie into existing culvert at downstream end.	internal diameter 0.6m to match existing Existing Length = 21.25m Total extended length = 37.75m
Denwick Burn (20.1)	4.1 N		54400		No works now required	Culvert in land adjacent to A1 mainline not affected by widening works
Denwick Burn (21.1)	5.1 Y		54600		Extension of existing culvert with new precast concrete pipe and head/wingwall at outlet	internal diameter 1.2m to match existing Existing Length = 72.3m Proposed Length of Extension = 38m Total Length = 110.3m DS channel realignment required assumed 0.5m bed width and 1:3 embankments tying into existing
Heckley Fence (22.1)	6.1 (option 2) N		55300		Existing arrangement to be replaced with new system north of overbridge earthworks. Pipe sizes and inlets to match existing and outfall to culvert on west side to culvert to be maintained. Culvert runs north to south on the west side of the A1 mainline and outfalling into denwick burn at approx. chainage 54720.	assumptions based upon site observation, and manhole locations on topo model. Pipe diameters and invert levels assumed for conservative scenario
Whitehouse Burn (23.1)	8.1 Y		56920		Extension of existing culvert with new precast box culvert and new head/wingwall at inlet	box section to match existing. Span at inlet different to outlet. Inlet 3.17m(w) x 3.14m (h), outlet 3.23m (w) x 3.44m(h) Existing Length = 21.7m Proposed Length of Extension = 15.60m Total Length = 37.30m
Kittycarter Burn (24.1)	9.1 N		58600		No work - Existing culvert to be retained	assumptions based upon site observation, and manhole locations on topo model. Pipe diameters and invert levels assumed for conservative scenario
Kittycarter Burn (24.2)	9.2 N		58600		Extension of existing culvert with new precast concrete pipe and head/wingwall at outlet	internal diameter 0.6m to match existing Existing Length = 25.5m Proposed Length = 26.5m Total Length = 52m
Kittycarter Burn (25.1)	10.1		58840		New culvert crossing B6347 outfalling to new watercourse diversion channel around Charlton mires junction	internal diameter 0.6m to match existing length 17m
Linkhall Culvert (26.1)	13.1 Y		59275		Extension of existing culvert with new precast box section and new head/wingwall at inlet	box section to match existing. Inlet dimension 2.14 m (w) x 2.18 m (h). Outlet 1.88 m (w) x 2.25 m (h). Existing Length = 20.10m Proposed length of extension = 50.8m Total Length = 70.90m
Shipperton Burn (27.1)	14.1 Y		60385		Existing structure 24° skew to be extended on outlet (east) side. Extension of existing culvert with precast box section and new head/wingwall at inlet	box section to match existing 2m(w) x 1.25m (h). Existing Length = 19.1m Proposed Length of Extension = 27.6m Total Length = 46.6m DS channel realignment required assumed 0.5m bed width and 1:3 embankments tying into existing  Natural bed to be included
Rock Culvert (28.1)	15.1 Y		58100		Existing structure to be demolished and replaced with new culvert on existing watercourse alignment/bed slope.	

Environment			Construction				
Scour Protection	Fish Passage	Mammal Passage	Inlet Invert level	Barrel Shape	Barrel Size	Outlet Length	Outlet Invert level
					mm (hwx)	m	
-	-	As existing	61.24	circular	500mm dia.	49.95	59.63
-	-	As existing	68.58	circular	300mm dia.	89	66.22
tbc	tbc	As existing	74.33	circular	600mm dia.	37.75	73.31 (estimated)
tbc	tbc	As existing	84.24	circular	1200mm dia.	110.3	81.32
tbc	tbc	tbc	94.09 (assumed)	circular (assumed)	300mm dia (assumed)	43.75	94.03 (assumed)
		As existing	83.58 (+0.15 natural bed = 83.73)	box	size to match outlet - 150mm natural bed - tbc	37.3	83.32 (surveyed soft invert, equivalent hard invert level assumed as 83.32 - 0.15 = 83.17)
		As existing	86.59	circular	450mm dia.	21.2	86.14
tbc	tbc	As existing	86.144	circular	600mm dia.	52	86.12
tbc	tbc	tbc	85.35	circular	600mm dia.	17	85.05
tbc	tbc	New mammal shelf	83.42 To be increased by 150mm to provide natural bed if estimated level is natural bed level rather than the solid culvert invert level	box	Size to match existing outlet	70.9	82.94 To be increased by 150mm to provide natural bed if estimated level is natural bed level rather than the solid culvert invert level
tbc	tbc	As existing	94.82	box	Size to match existing outlet	46.75	93.8
tbc	tbc		89.44 To be increased by 150mm to provide natural bed if estimated level is natural bed level rather than the solid culvert invert level	circular	1200mm dia.	17	89.29 To be increased by 150mm to provide natural bed if estimated level is natural bed level rather than the solid culvert invert level

### **Online Culvert Extensions Methodology-Pipes**

It will be advisable to carry out the extension works whilst the flows through the culvert are diverted to an alternative route. This may be an adjacent culvert, pipe or drainage channel. If this is not possible, a temporary sump shall be excavated on the upstream end of the existing culvert, and with the culvert dammed, a 6 inch pump will divert the flow through the culvert by means of a 6 inch pipe suspended above the culvert floor.

Culvert extension works may now proceed free of flowing water-It must be noted that in times of flood, the temporary pumping arrangement may need to be suspended and flows allowed to again flow through the culvert, suspending construction works for this period.

The culvert bed shall be excavated to formation level and a layer of blinding concrete placed.

The pipe sections shall be lifted into place with a large tracked excavator and the pipe sections pulled together ensuring the proprietary seals between the units is in place. The installation shall be carried out sequentially, ensuring correct vertical and horizontal alignment is maintained. On completion of the pipe installation, the external faces shall be waterproofed and concrete protection placed where detailed. They will then be backfilled and compacted with 6N granular material. The wing walls will then be constructed in in situ concrete, following which waterproofing and backfilling of these walls may proceed. The rip rap /scour protection, to the approaches and departures of the culvert shall then be installed and levelled to the required profiles. Any natural beds will be placed through the culvert

The watercourse may then be diverted through the new culvert, allowing road construction and demolition activities to proceed.

### **Online Culvert Extension Methodology-Precast Concrete Box sections**

It will be advisable to carry out the extension works whilst the flows through the culvert are diverted to an alternative route. This may be an adjacent culvert, pipe or drainage channel. If this is not possible, a temporary sump shall be excavated on the upstream end of the existing culvert, and with the culvert dammed, a 6 inch pump will divert the flow through the culvert by means of a 6 inch pipe suspended above the culvert floor.

Culvert extension works may now proceed free of flowing water-It must be noted that in times of flood, the temporary pumping arrangement may need to be suspended and flows allowed to again flow through the culvert, suspending construction works for this period.

The culvert bed shall be excavated to formation level and a layer of blinding concrete placed. Following this, a sand screed shall be placed to the underside of precast culvert section level.

The culvert sections shall be lifted into place with a mobile crane or large tracked excavator and the sections pulled together ensuring the proprietary seals between the units is in place. The installation shall be carried out sequentially, ensuring correct vertical and horizontal alignment is maintained. On completion of the culvert unit installation, the external faces shall be waterproofed and concrete protection placed where detailed. They will then be backfilled and compacted with 6N granular material. The wing walls will then be constructed in in situ concrete, following which waterproofing

and backfilling of these walls may proceed. The rip rap/scour protection to the approaches and departures of the culvert shall then be installed and levelled to the required profiles. Final natural bed installation required will complete the works.

The watercourse may then be diverted through the new culvert and the temporary open course backfilled with suitable material, allowing road construction and demolition activities to commence.

### **New Culvert Construction Methodology-Pipe sections**

Prior to commencement of the works, the flow of the open burn channel shall be diverted to an alignment approx. 10m north or south from the route of the proposed culvert construction into a preformed open channel to allow the works to be carried out free of flowing water.

The culvert bed shall be excavated to formation level and a layer of blinding concrete or pipe bedding placed.

The pipe sections shall be lifted into place with a large tracked excavator and the sections pulled together ensuring the proprietary seals between the units is in place. The installation shall be carried out sequentially, ensuring correct vertical and horizontal alignment is maintained. On completion of the pipe unit installation, the external faces shall be waterproofed and concrete protection placed where detailed. They will then be backfilled and compacted with 6N granular material. The wing walls will then be constructed in in situ concrete, following which waterproofing and backfilling of these walls may proceed. Any rip rap/scour protection to the approaches and departures of the culvert shall then be installed and levelled to the required profiles. Final natural bed installation will complete the works.

The watercourse may then be diverted through the new culvert and the temporary open course backfilled with suitable material, allowing road construction and any demolition activities to commence.

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