City of BRADFORD METROPOLITAN DISTRICT COUNCIL

Kirklees COUNCIL

Flood Risk Assessment / Drainage Impact Assessment Technical Note

WYTF A629 Halifax Road Phase 5

Revision: 9-0

Prepared by	SP, PR	SP	SP	SP	SP
Checked by		SH	SH		
Approved for Issue					
Revision Number	7-1	7-2	7-3	8-0	9-0
Issue Date	07/05/2020	02/07/2020	20/07/2020	20/10/2020	01/12/2022

CONTENTS

Page

1.0 Introduction.....1

2.0 Flood Risk Assessment 2

3.0 Area B - Cavalry Arms junction.....5

4.0 Area C - Prince Royd (car park).....6

5.0 Area D - Ainley Top roundabout.....7

APPENDICES

A Calculations

B Preliminary Scheme Drawings

C Kirklees LLFA Consultation

D Yorkshire Water Consultation

1.0 Introduction

1.1 This Flood Risk Assessment Technical Note (TN) has been prepared by Bradford Council's Land Drainage Team to support a Planning Application for a number of highway improvement schemes within the Kirklees district, as described below and shown on figure 1.

Area B - Birkby Road / Halifax Road / East Street junction (Cavalry Arms junction)

Area C - Cavalry Arms junction to Birchencliffe Hill Road (Prince Royd), and

Area D - Yew Tree Road and Ainley Top roundabout (Ainley Top)

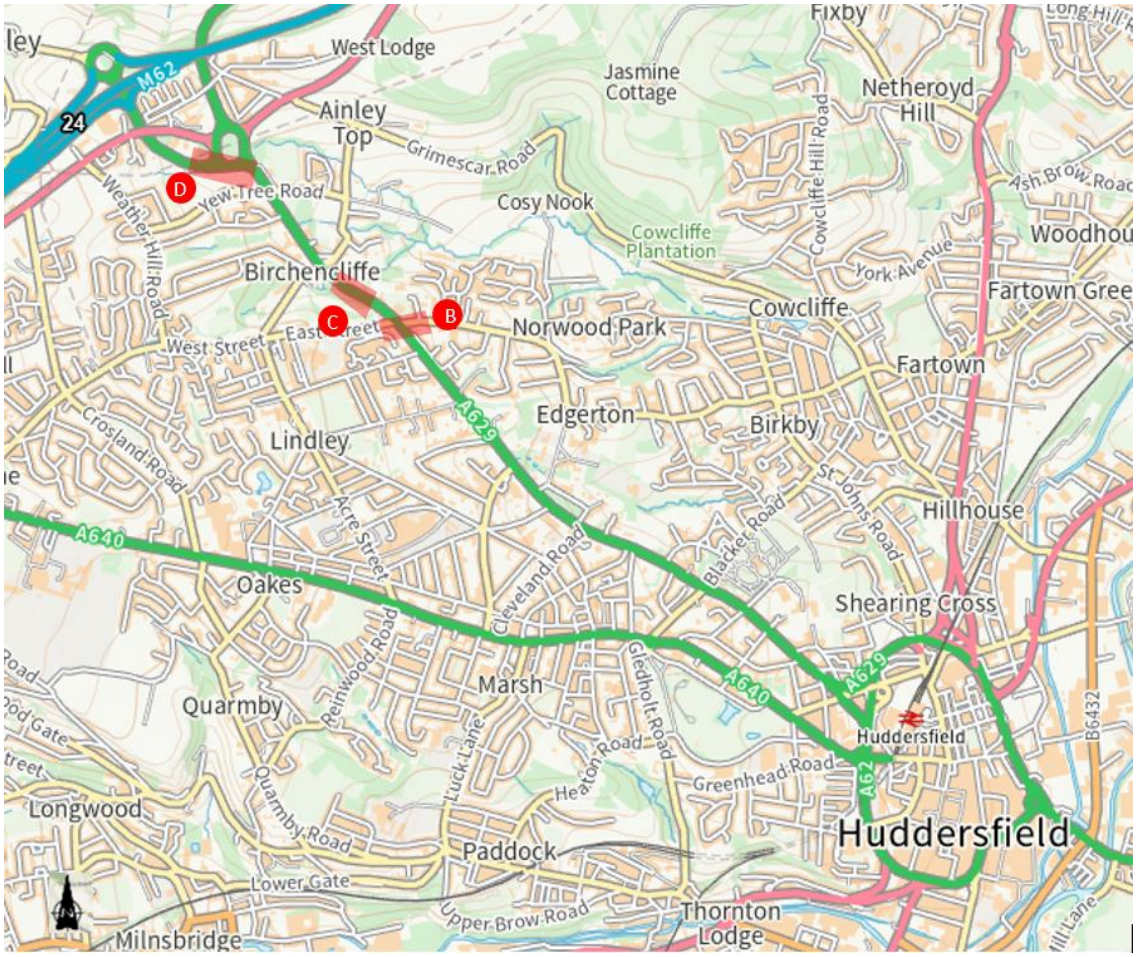


Figure 1 Map data © Crown Copyright and database right 2019. Ordnance Survey 100019241

2.0 Flood Risk Assessment

The three sites are located within Flood Zone 1 – ref. EA Flood Map for Planning. The risk of flooding from Main River is considered to be LOW / Negligible.

As each site is under 1 hectare, the Environment Agency's standing advice is that there is no need for a formal 'Flood Risk Assessment'. However, even if the Government Guidance is followed the proposed developments are considered 'appropriate' as all four sites are located within Flood Zone 1. (See NPPG Paragraph: 067 Reference ID: 7-067-20140306, Revision date: 06 03 2014). All types of development are appropriate in Flood Zone 1, including 'Essential Infrastructure'.

The EA Map showing the Risk of Flooding from Surface Water indicates that all four sites are at Medium Risk. However, this should not preclude the proposed developments, because it is expected that roads will flood during heavy rainfall and this is preferable to the flooding of more vulnerable receptors, such as dwellings. Furthermore, the surface water flood maps do not fully take into account the existing surface water drainage systems, which prevent surface water flooding.

As all four sites involve road widening and/or the creation of additional impermeable area, there is the potential for them to increase flood risk elsewhere. As such, the remainder of this FRA will consider the measures which will be provided to mitigate against this risk and ensure that surface water flood risk is reduced overall.

3.0 Area B - Cavalry Arms junction

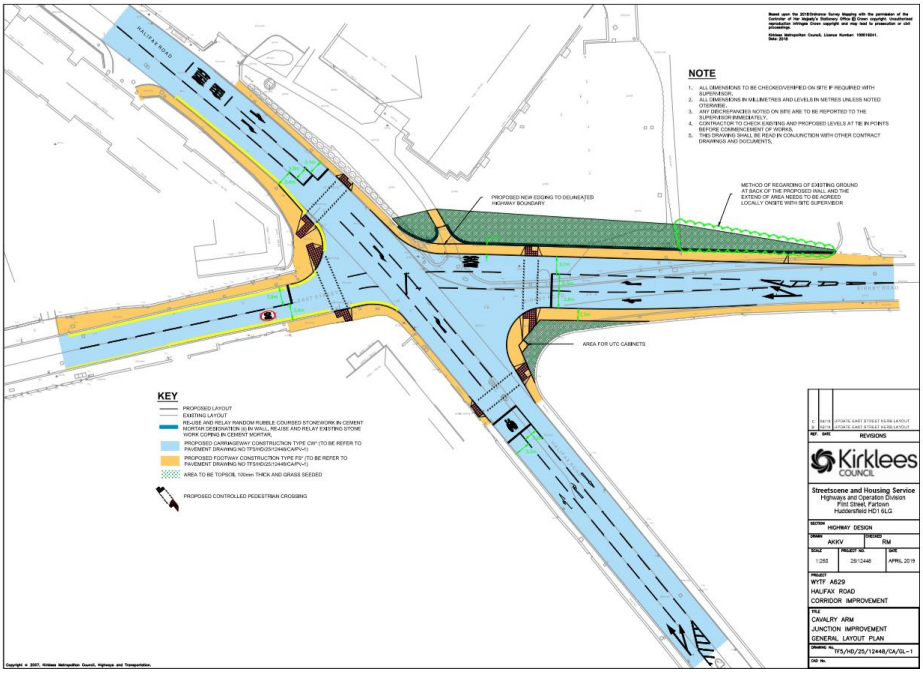


Figure 2 - Proposed Highway Widening Scheme

3.1 The proposals are to improve the efficiency of the junction. Approximately 400 m^2 of additional impermeable area will be created along Birkby Road, as indicated by the green shaded area on Figure 2, above.

3.2 In terms of the surface water drainage hierarchy, soakaways have been considered, but there is insufficient land available to accommodate these and Kirklees LLFA have advised that there are no watercourses within the immediate vicinity.

3.3 A drainage connectivity survey has identified that all the existing highway gullies along Birkby Road feed into the public, combined water sewer. Given that the increase in impermeable area is relatively small, both Yorkshire Water and the LLFA have agreed that surface water attenuation is NOT required.

3.4 However, in order to mitigate against the impacts of this scheme, 330m^2 of existing highway drainage will be removed from the Yorkshire Water sewer in Halifax Road, as part of the Prince Royd car park scheme.

3.5 Silt from the road will be contained by trapped gullies and the new drainage system will be maintained by Kirklees Highways Department.

4.0 Area C - Prince Royd

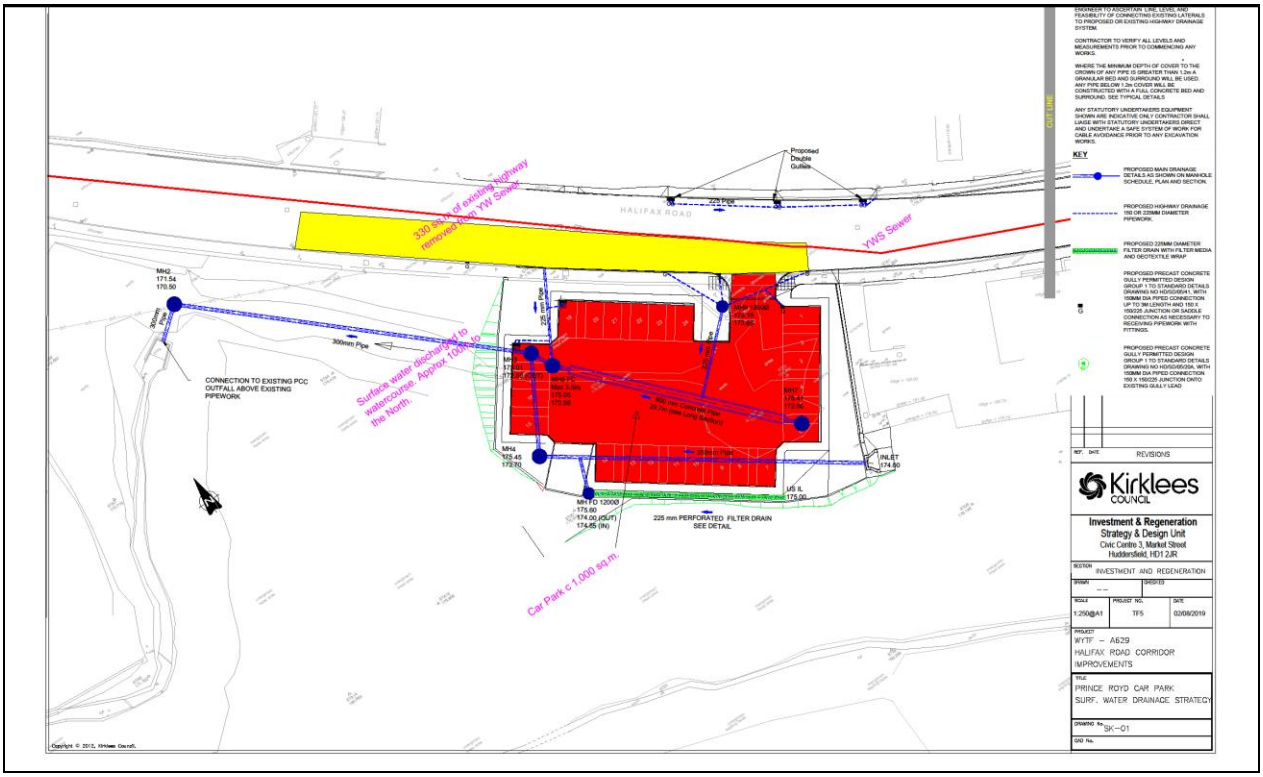


Figure 3 - Proposed Scheme and Surface Water Drainage Strategy

4.1 It is proposed to create a new car park just off Halifax Road, in the Prince Royd area. The site is currently greenfield and the new car park will create approximately 1,000 m^2 of additional impermeable area. However, the proposed scheme will also incorporate 330m^2 of existing highway, in order to off-set the proposed works at Cavalry Arms.

4.2 The Ground Investigation states: *'there are no superficial (drift) deposits within the site area. However, the geological map indicates artificial deposits comprising made ground and infilled ground throughout the site…The site is underlain by Carboniferous Lower Coal Measures strata above the Sub-crenatum Marine Band, comprising undifferentiated strata consisting of predominantly mudstones and siltstones with thin beds of sandstone… Weathered mudstone bedrock was encountered in TP012 at 2.80m.bgl'*.

4.3 The Ground Investigation concludes that: '*Infiltration drainage is not feasible due to the presence of low permeability soils and bedrock and shallow groundwater. On-site attenuation and a restricted off-site discharge to a surface watercourse is required'*.

4.4 The proposed surface water drainage strategy is, therefore, to provide a surface water drainage system which will collect rainfall from the new car park and Halifax Road, and for this to discharge at a restricted rate of 3.5 litres per second to the watercourse, located approximately 100m to the North West of the site.

4.5 The new, highway drainage system, will be designed for the critical 1 in 100-year storm, including 30% uplift for climate change.

4.6 Silt will be contained by trapped gullies and a catch pit manhole located upstream of the attenuation storage, which will be sited underneath the new car park. As the number of parking spaces is less than 50, it is not intended to provide an Oil Separator. The new drainage system will be maintained by Kirklees Highway Department.

5.0 Area D - Ainley Top

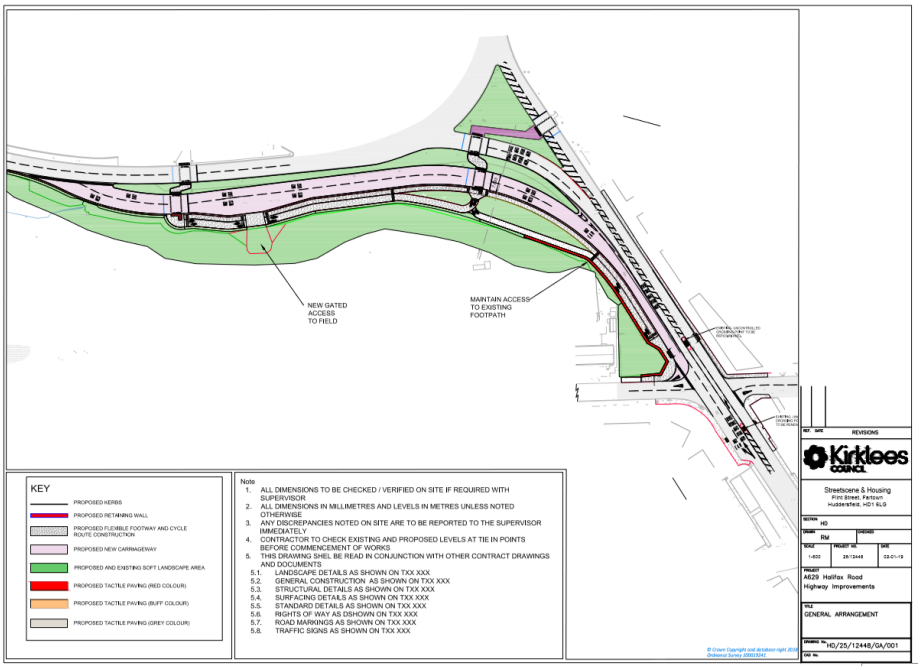


Figure 4 – Proposed Highway Improvements

5.1 The proposals are to create a new slip road and cycle/footway at the junction of Halifax Road with the Ainley Top roundabout. The new carriageway and footway will create approximately 3,433 m^2 of additional impermeable area (see Fig 6).

5.2 The site is located within EA Flood Zone 1, i.e. Low risk of flooding from Main River. There is, however, a minor ('Ordinary') watercourse and a highway drain within the vicinity of the proposed works – these are shown on Figure 5, below. The LLFA has advised that these are unlikely to affect the proposed works, but if diversions are required, these can be dealt with as part of the detailed design.

5.3 Kirklees LLFA has also advised that there have been a number of minor flooding incidents at this location, but the proposed scheme is not expected to have an adverse impact on the flooding receptors.

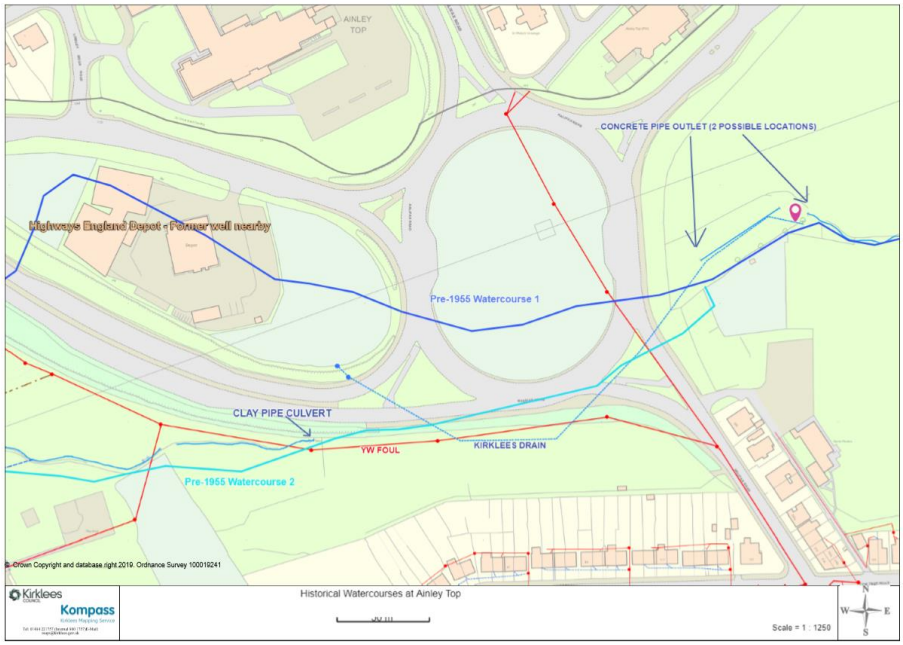


Figure 5 – Existing Drainage Features

Figure 6 – Proposed Surface Water Drainage Strategy

5.4 Ground investigations, including soakaway tests have been carried out by Leeds City Council's Geotechnical Section. These have proved that the ground is unsuitable for soakaways.

5.5 A drainage investigation has been carried out and this has found that the existing highway to the South of the roundabout connects to the culverted watercourse, which runs across the SE edge of roundabout. It is therefore intended that the new slip road from the top of Halifax Road will drain into this system. See blue area in Fig 6, above.

5.6 The drainage investigation has also found that the highway gullies between Yew Tree Road and the top of Halifax Road all connect into the Yorkshire Water combined water sewer in Halifax Road. Levels will not allow this section of road to drain to the watercourse by gravity, therefore it is intended that this section of highway will connect into the public, combined water sewer, in Halifax Road. See the red area in Fig 6, above.

5.7 In order to ensure that flood risk is not increased on the watercourse, part of the existing highway will be disconnected from the watercourse and connected into the new highway drainage system for the roundabout. The discharge rate from the new highway drainage system will be 13.0 L/s (ie 0.8L/s less than the original flow rate to the culvert). This will ensure that the scheme helps to reduce flood risk overall. The new drainage system will be designed to cater for the critical 1 in 100-year storm, including 30% uplift for climate change.

5.8 The same principles, outlined in paragraph 5.7 will be applied to the new highway between Yew Tree Road and the roundabout. The final discharge to the sewer will be 10.0L/s. This represents a net reduction in peak flow to the sewer of 0.9L/s. The new highway drainage system will be designed to cater for the critical 1 in 100-year storm, including 30% uplift for climate change. Please refer to Appendix B for outline scheme details.

5.9 Silt will be contained by trapped gullies and a catch pit manhole located upstream of the two attenuation storage tanks. The new drainage system will be serviced and maintained by Kirklees Highway Department.

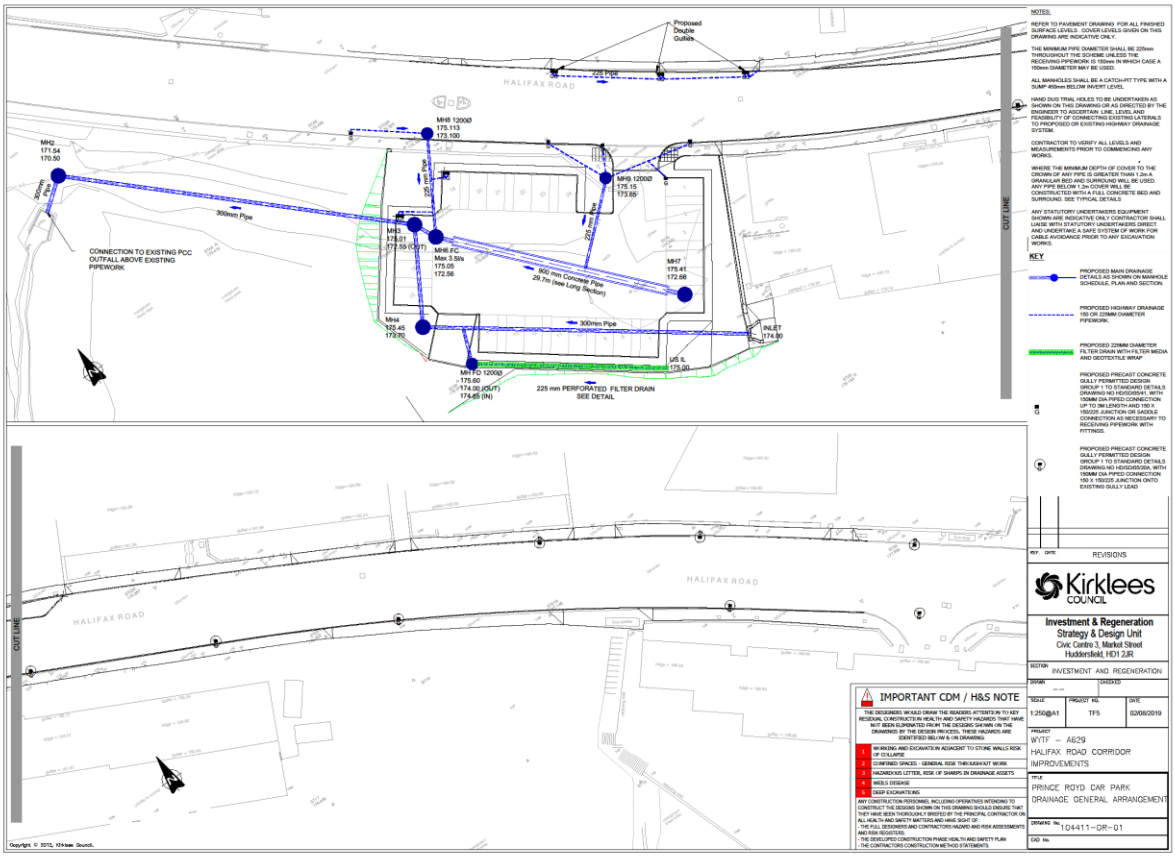
APPENDIX A

Calculations

Area B - Cavalry Arms junction

No attenuation required. Please see LLFA and YW correspondence.

Area C - Prince Royd



Prince Royd Car Park - Proposed Drainage Scheme

REMOVE existing gully connections from the combined sewer in Halifax Road, immediately adjacent to the new car park to off-set the proposed works at Cavalry Arms and connect these into the new highway drainage system for the car park.

Impermeable area removed from public sewer = 330m^2

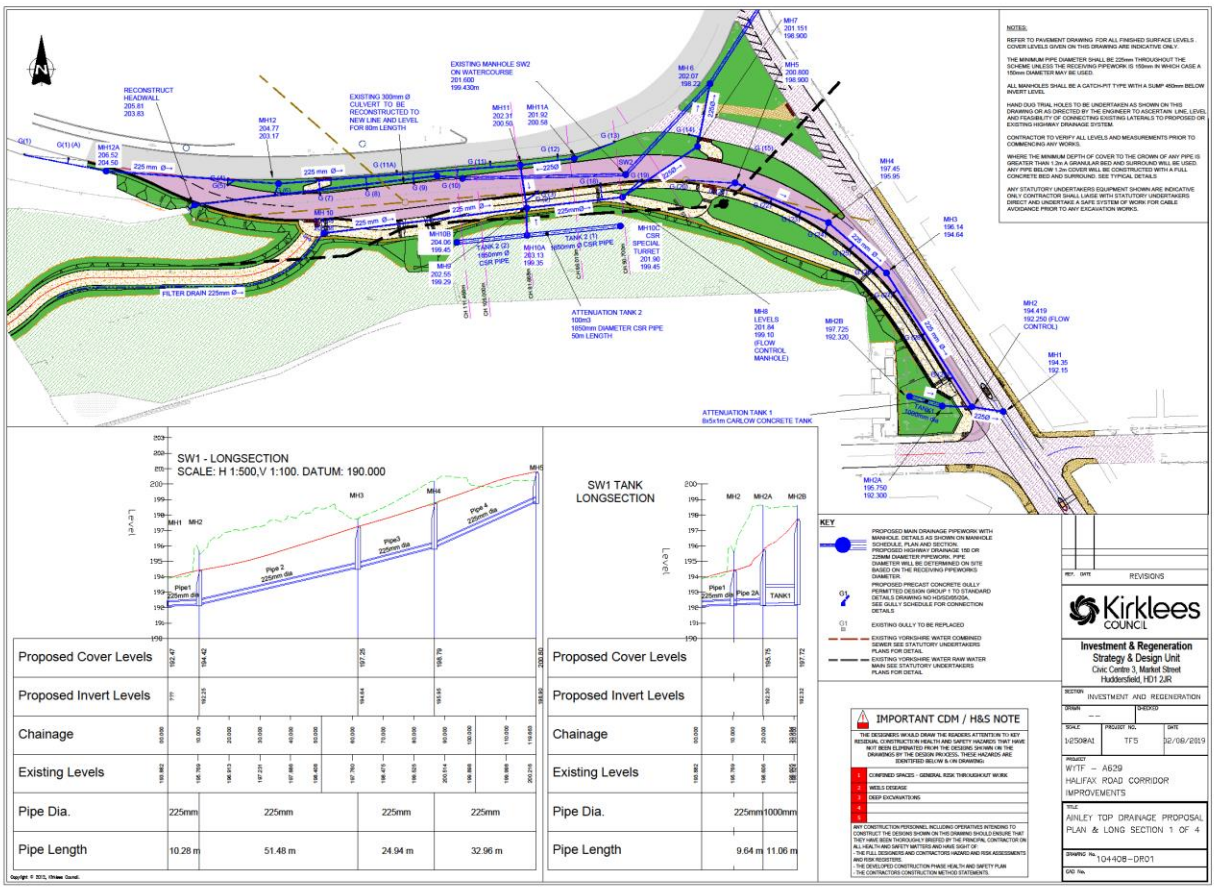
Area of new car park = 1,000m^2

Total Contributing Area connecting into the new Highway Drainage system = 1,330m^2

Quick Storage calculator estimates **41 m^3** of storage for 1,330m^2 I.A. and 3.5 L/s discharge for 1 in 100 yr +30% climate change. (Cv =0.84)

Try 30m of 900mm dia. Pipe. Storage Vol.	= 19 m^3,
2 no. MHs at 1500 mm dia x 2.5m deep	= 9 m^3
2 no. MHs at 1200 mm dia x 1.8m deep	= 4 m^3
Flooding of car park approx. 200m2 x 50mm deep @174.90m AOD).	= 10 m^3 (Double gully in NW corner
Total Storage Volume Provided	**= 42 m^3 Okay.**

Area D - Ainley Top



Ainley Top - Proposed Drainage Scheme

1) Watercourse System (A)

Existing highway network to be REMOVED from the watercourse = 990 m^2 (blue cross hatching)

REMOVE existing gully connections from the culverted watercourse and connect these into the new highway drainage system.

Flow removed from watercourse = 13.8 L/s (140 l/s/ha x 0.099 ha).

Total Contributing Area connecting into the new Highway Drainage system (A) = 3,450 m^2 (solid blue hatching)

Reduce post-development flow to the watercourse to 13.0 L/s

Quick Storage calculator estimates **98 m^3** of storage for 3,450 m^2 I.A. and 13.0 L/s discharge for 1 in 100 yr +30% climate change. (Cv = 0.84)

Try 1850 Dia. CSR Pipe x 63m Long.

Total Storage Volume Provided = 134 m^3 Okay.

2) Public Sewer: System (B)

Existing highway REMOVED from the sewer = 777 m^2 (red cross hatching)

REMOVE existing gully connections from YW sewer along Western kerb edge of Halifax Road, between Yew Tree Road and the roundabout.

Flow removed from sewer = 10.9 L/s (140 l/s/ha x 0.0777ha).

Total Contributing Area connecting into the new Highway Drainage system (B) = 1,750 m^2 (solid red hatching).

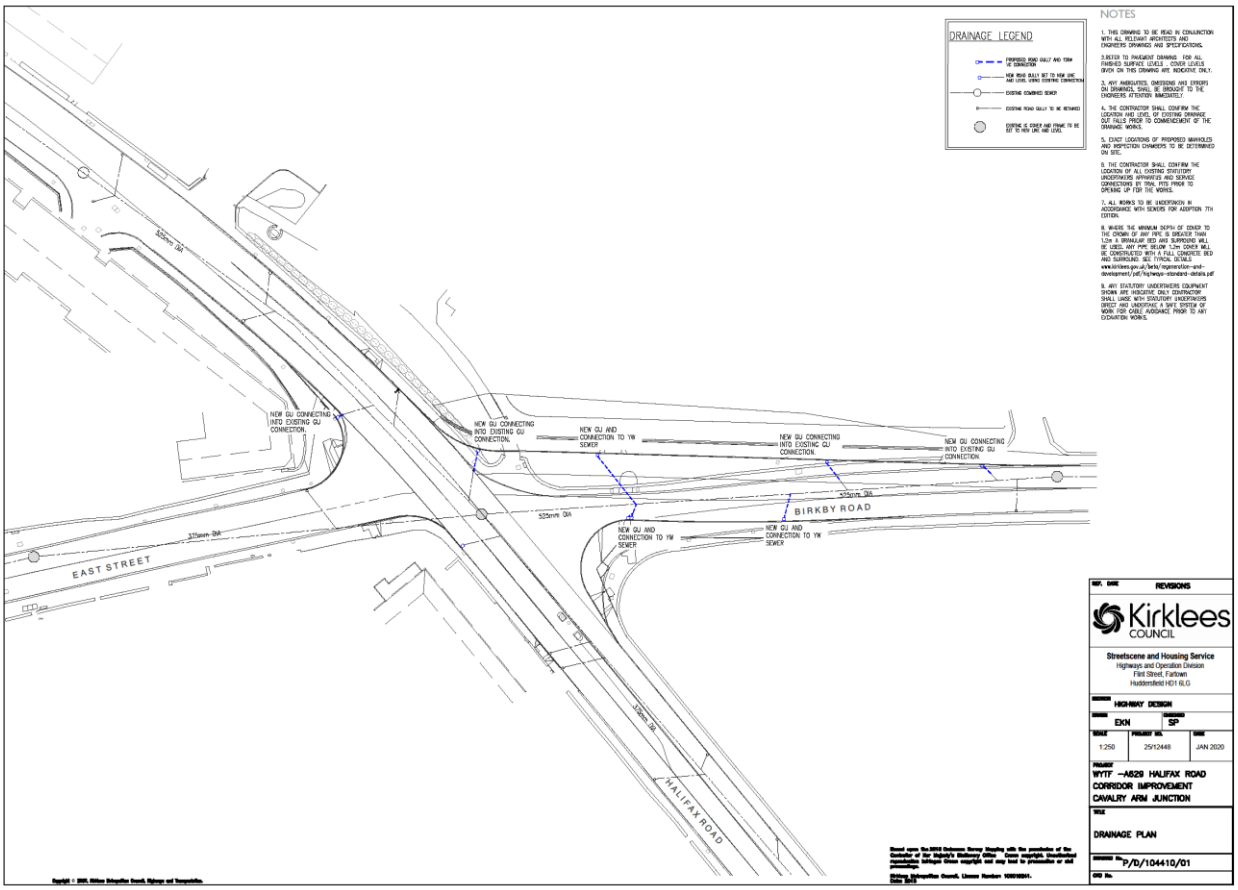
Reduce post-development flow to the sewer to 10.0 L/s

Quick Storage calculator estimates 41 m^3 of storage for 1,750 m^2 I.A. and 10.0 L/s discharge for 1 in 100 yr +30% climate change. (Cv = 0.84).

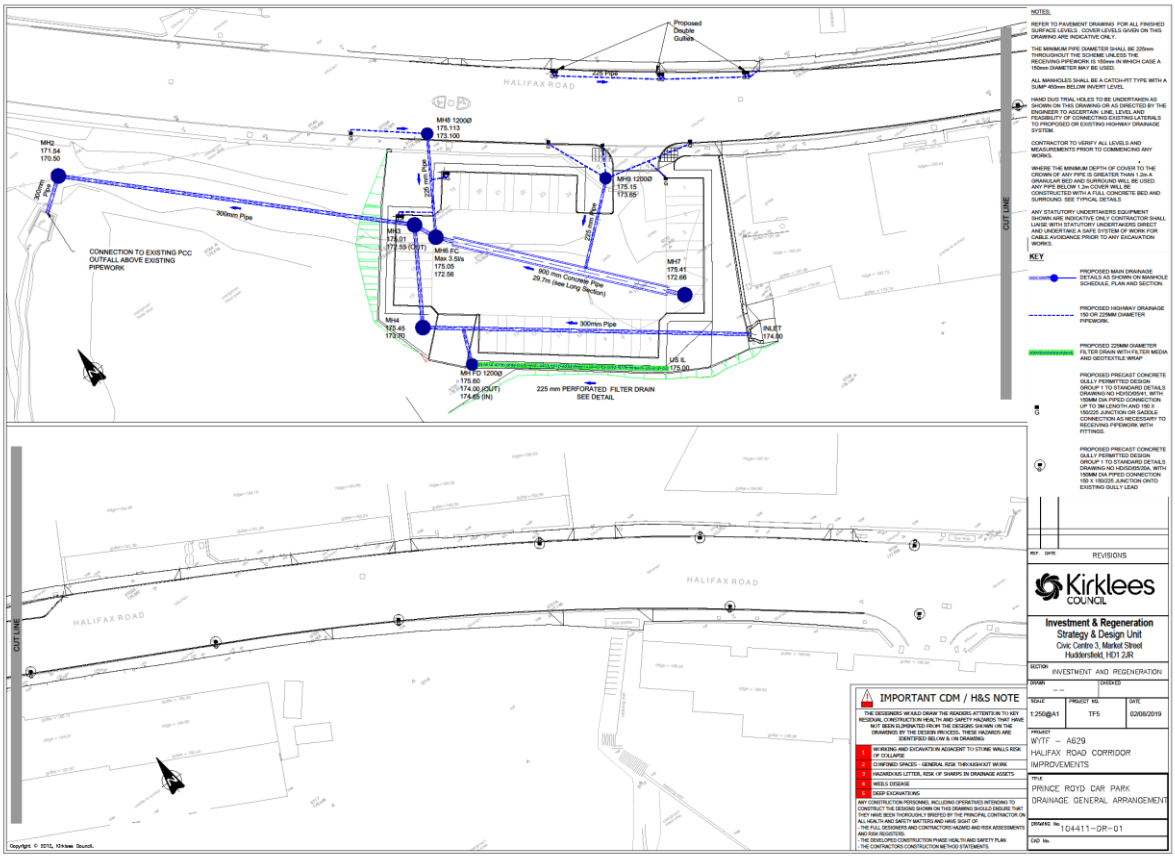
Use Precast Concrete tank (8 x 5 x 1.0m deep)	= 40 m^3
FCMH (1500 Dia. X 2.5m dp.)	= 4 m^3
Total Storage Volume Provided	**= 44 m^3 Okay.**

APPENDIX B

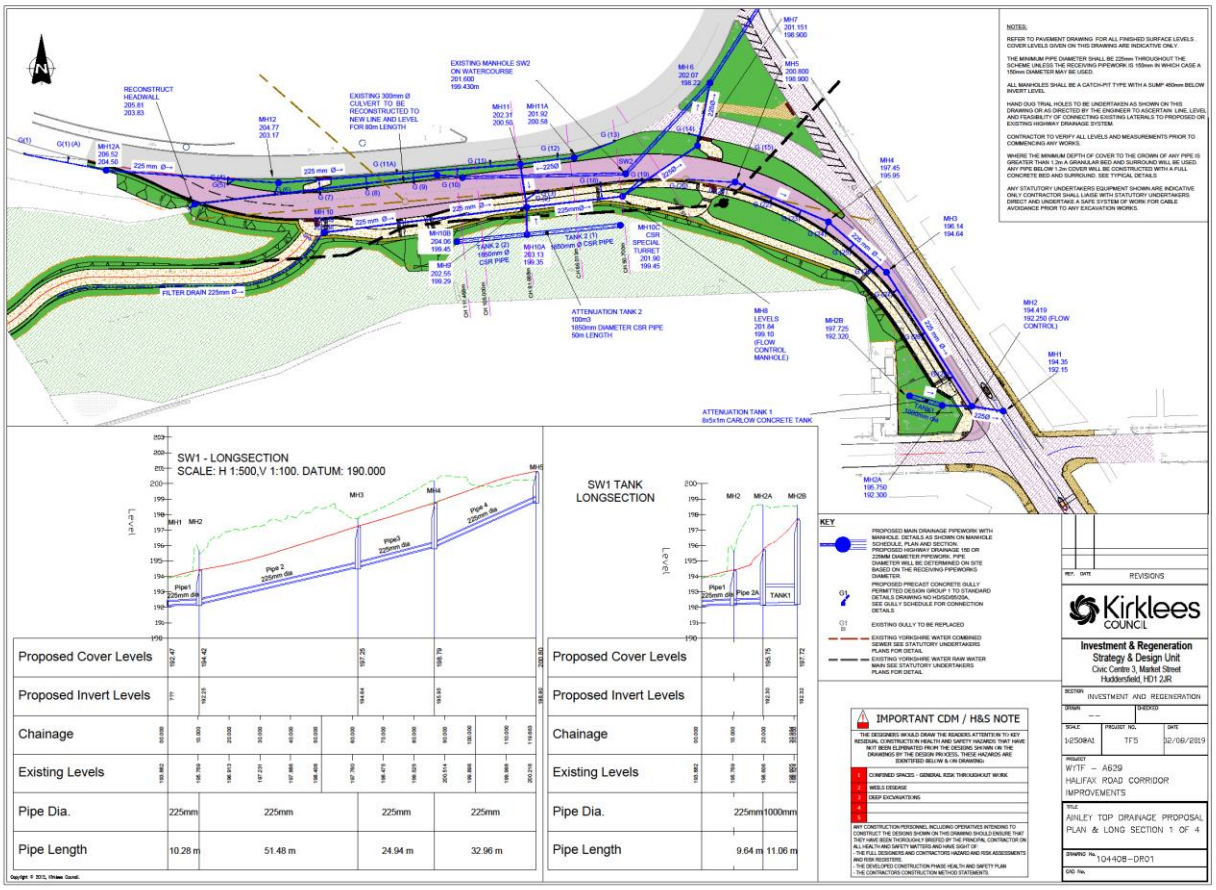
Drainage Scheme Drawings



Area B - Cavalry Arms junction



Area C - Prince Royd Car Park



Area D - Ainley Top

APPENDIX C

Kirklees LLFA Consultation

APPENDIX D

Yorkshire Water Consultation