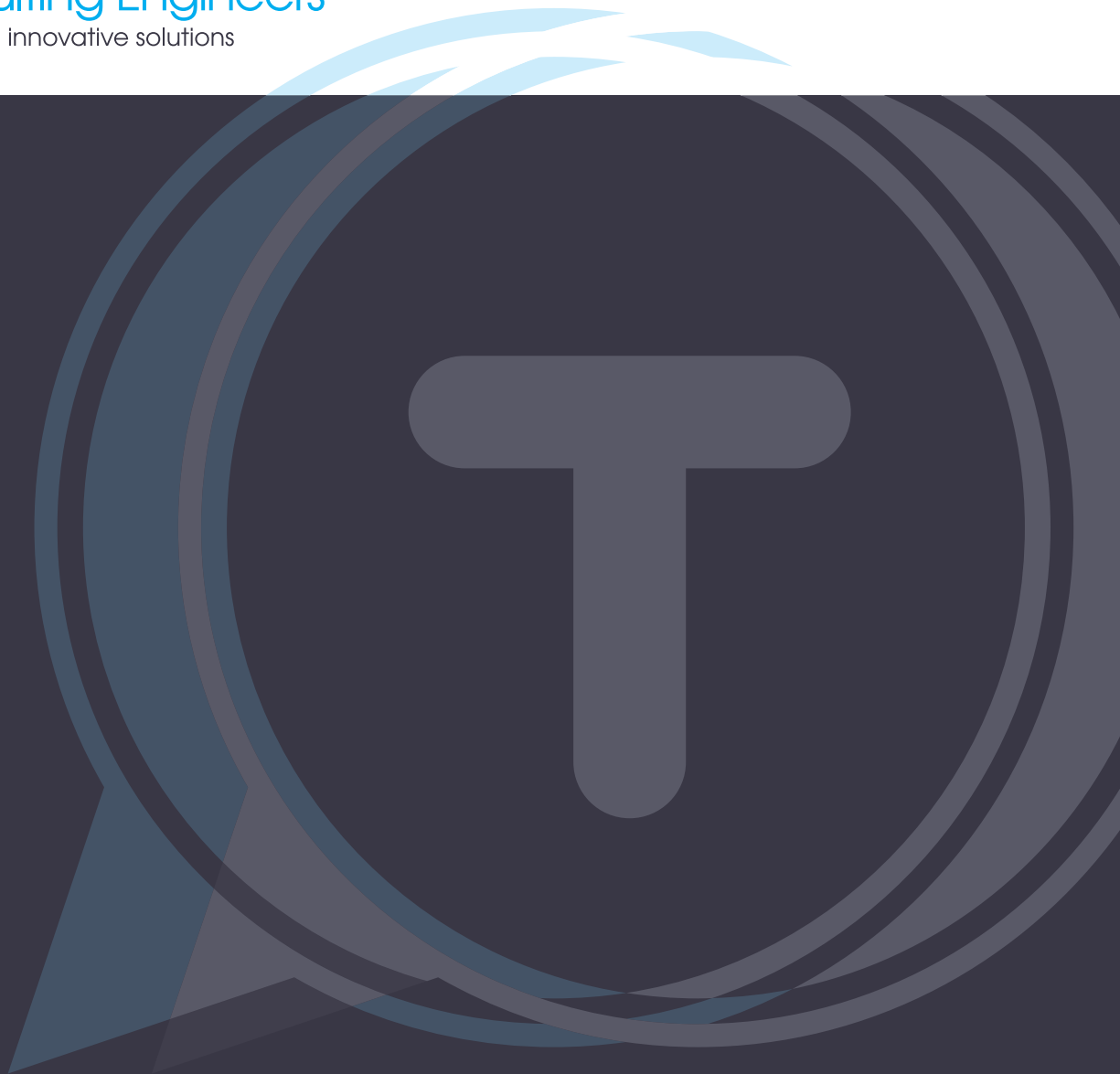




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True Consulting Engineers
Ringslade House
Broadway Road
Newton Abbot
TQ12 3EH
Tel: 01626 572 672
admin@trueconsultant.co.uk

Report Title:

**PROPOSED COMMERCIAL REDEVELOPMENT
FLOOD CONSEQUENCE ASSESSMENT AND DRAINAGE
STRATEGY**

Project:

THE CO-OPERATIVE, HIGH STREET, COEDPOETH. LL11 3UF

Client:

WILLIAMS SOUTHERN LIMITED (CONSTRUCTION).

Report Ref:

1436 - C300



Date:

MAY 2018



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Ringslade House
Broadway Road
Newton Abbot,
Devon TQ12 3EH
Tel: 01626 572 672
e-mail: admin@trueconsultant.co.uk
www.trueconsultant.co.uk

APPENDICES

- A Drawings
- B Intrusive Site Investigation Report Extracts
- C Flood maps / Flood data
- D Percolation Testing Report Extracts
- E South West Water Records and Correspondence
- F Micro Drainage Attenuation Volume Requirements
- G Maintenance Schedule for SUDS

REVISION RECORD Report ref: 1436					
Rev	Description	Date	Originator	Checked	Approved
A	Initial Issue	2 nd May2018	MQ	SJM	SJM

TRUE Consulting Engineer Produced:

TRUE Consulting Engineer Approved:

Signed

Name: Mike Quigley
Professional Qualifications: Consultant
Date 02/05/2018

Signed
DESIGN TEAM LEADER

Name: Steve Morrell
Professional Qualifications: BEng (Hons) CEng MICE
Date 02/05/2018

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1 EXECUTIVE SUMMARY

1.1 Summary

TRUE Consulting Engineers were commissioned by Williams Southern Ltd. (Construction) to undertake the Flood Consequence Assessment (FCA) in support of, and to accompany the planning application for the redevelopment of the Co-Operative Fuel Filling Station and associated retail area.

The site is 1514m² (0.15Ha) in area and is located at National Grid Reference SJ 28090 51445. The post code for the site is LL11 3UF.

The site is currently a developed site occupied by an existing fuel filling station and retail unit. The site is to be extended, taking in the adjoining detached dwelling, and redeveloped with a larger retail unit and amendments to the forecourt area to provide additional parking etc.

An aerial view of the site can be seen below in Figure 1.

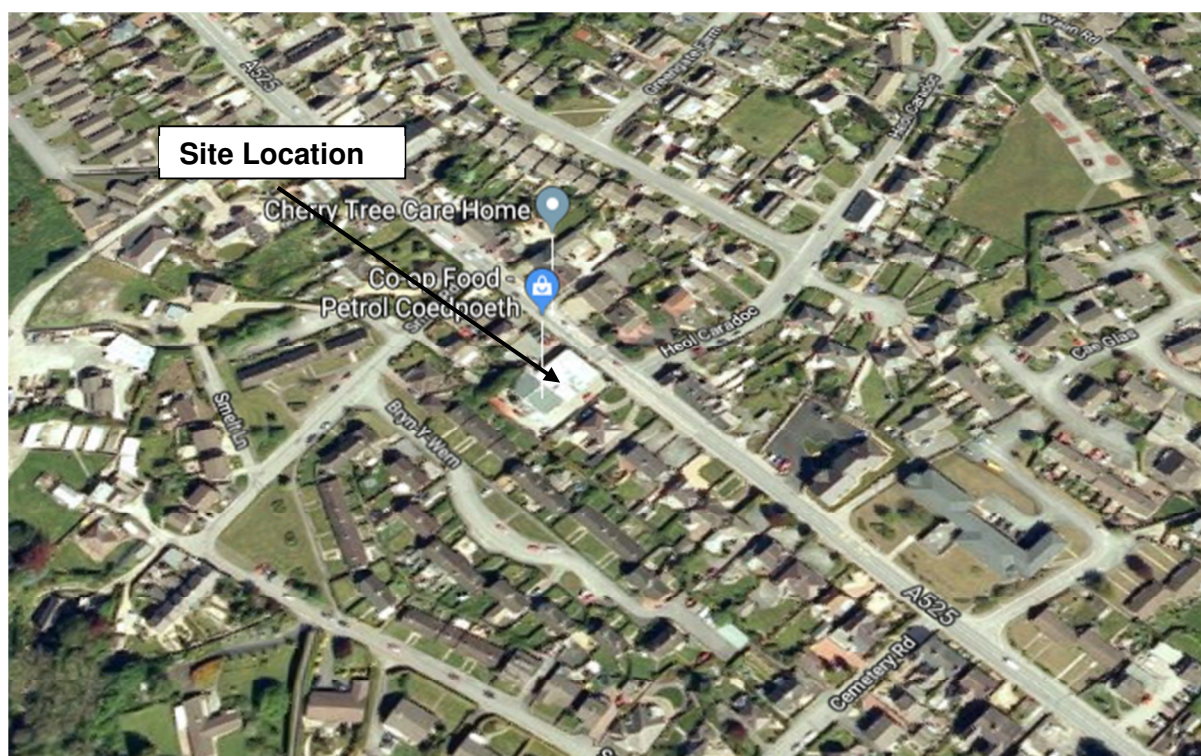


Figure 1: Aerial view of the site location

This report has been produced in accordance with, and addresses the relevant areas of the Welsh Government Planning Policy Wales and Technical Advice Note (TAN) 15.

Existing flood data produced by Natural Resources Wales, in the form of indicative flood risk maps, highlight areas potentially at risk of flooding for events of a 1% annual risk of flooding



from rivers and 0.5% annual risk from tidal/coastal areas. Maps showing areas at risk of Surface Water flooding and Reservoir flooding are also available and have been used in this report assessment.

The report provides the principles for foul and surface water drainage management along with flood prevention.

Foul water drainage will discharge to the Welsh Water foul water sewer and Welsh Water have confirmed that there is adequate capacity within their network to take the discharge.

Storm water drainage from the site will be discharged to the local Welsh Water combined water sewer network at a controlled rate not exceeding 5L/s. These proposals have been accepted by Welsh Water.

1.2 The Requirements for a Flood Consequence Assessment

The purpose of this Flood Consequence Assessment and Drainage Philosophy is to examine any potential risks to the proposed development and to also establish if there will be any risks to existing flood defences and downstream flood areas. This report provides the principles for the foul and surface water drainage management along with flood prevention.

In the event that planning approval is granted, a detailed design of the surface and foul drainage systems will be undertaken. This document outlines the drainage strategy in dealing with surface water and foul water disposal from the proposed development. The layout is therefore subject to alteration during the detailed design stage, although once finalised, construction drawings will be submitted to the Local Drainage Authority for approval as required under any relevant planning conditions.



2 SITE HISTORY

2.1 Introduction

The development site is a Brownfield site, which is currently occupied by an existing fuel filling station and retail unit.

2.2 Previous Report

No Flood Consequence Assessments are known to have been previously submitted in support of this proposed development.

2.3 Consultation

Pre-development discussions have taken place with Welsh Water and Natural Resources Wales in order to agree the principles for draining the proposed site.

Mapping of the Welsh Water sewer records has been obtained and discussions have taken place regarding the available spare capacity within their network locally.

Natural Resources Wales mapping showing areas at risk of flooding has also been obtained and is included within this report.

3 EXISTING SITE CONDITIONS

3.1 Site Location

The site is located on the southern side of the A525 High Street, Coedpoeth, Wrexham.
The National Grid Reference for the site is SJ 28090 51445.
The post code for the site is LL11 3UF
The topographical survey of the existing site is shown at **Appendix A1**.

3.2 Existing Site Description

The site is currently 1514m² in area and is 97% impermeable.
Impermeable areas are made up of the forecourt, retail outlet, parking areas, the detached dwelling and its associated hard paved external areas.

The topographical survey of the existing site is attached at **Appendix A1**.

A drawing showing the Pre and Post development impermeable areas is shown in **Appendix A2**.

Onsite drainage investigations have identified that all storm water and foul water drainage from the site is discharged to the Welsh Water combined sewer network located to the northwest of the site, in the grounds of the detached dwelling which will be demolished to allow for the extension to the fuel refilling station and retail outlet.

A copy of the drainage records for the existing site is shown on the topographical survey attached at **Appendix A3**.

The site typically falls from the southwest to the northeast. High Street runs along the northern boundary of the site. Residential properties are located on all other sides of the development site.

3.3 Existing Geology/Hydrogeology

An intrusive Site Investigation was carried out by 'Subadra' in February 2017 in order to provide an understanding of the existing geology and hydrogeology of the site. Extracts from the Intrusive Site Investigation Report are attached at **Appendix B**.

The site was shown to consist of made ground to depths of 1.2m, overlaying Glacial Tilt from 1.2m to 2.5m below ground level. The Glacial Tilt was described as firm to stiff orange brown grey mottled clay with frequent fine gravel and this overlaid Pennine Lower Coal Measures, described as stiff to very stiff grey brown friable sandy clay or weak to moderately weak grey highly weathered Mudstone with occasional bands of black coal measures and sub angular grey gravel.

Groundwater strikes occurred between 1.7m and 4.0m below ground level in 3No of the bore holes. Resting groundwater was between 2.7m and 5.9m

3.4 Hydrology

There are no watercourses in close proximity to the site. The nearest watercourses are the River Clywedog located approximately 230m to the west / southwest of the site, and a tributary of the River Gwenfro located approximately 400m to the north of the site.

3.5 Sources of Flooding

The Natural Resources Wales flood maps shown in **Appendix C1** indicate the site lies within Flood Zone A and has a very low risk of flooding from either fluvial or tidal sources. This zone comprises of land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year (<0.1%).

The site is not considered to be at any risk of flooding from groundwater or public sewers and there is no known risk of flooding from reservoirs, mines, quarries or land drainage systems. Welsh Water have confirmed that they hold no records of sewer flooding on the site or in the vicinity of the site. Welsh Water correspondence is included in **Appendix E**.

The Lead Local Flood Authority have however provided historical records of flooding in the properties directly opposite the development site. This flooding is understood to be as a result of insufficient Highway Drainage. Details of this Flooding are included at **Appendix C2**.

Levels on the existing site are relatively level and tie in with the back of footway levels on High Street. High Street is constructed on a longitudinal curve with the crown of the vertical curve immediately outside the site. Levels therefore fall very nominally on High Street in both the northwest and southeast. Any exceedance event flood flows from the site would eventually flow onto High Street which would act as a conduit carrying flows within the highway to both the northwest and southeast directions. This route for exceedance flood flows will be retained in the detailed design for the proposed development.

3.6 Existing Flood Alleviation Measures

The site is not known to benefit from existing flood alleviation measures.

3.7 Existing Run Off

All storm water drainage from the site is discharged to the local sewer network at an uncontrolled rate.

3.8 Existing Run Off from Exceedance Events

The site is almost completely impermeable and positively drained. During exceedance events, any overland flood flows will be to the front of the site and out onto High Street.

High Street is a typical road construction with channel lines constructed using standard kerbs and road gullies. The road would act as a conduit carrying flood flows within the

highway towards both the northwest and the south east as the forecourt is located on a crest in High Street.

4 FUTURE PROPOSAL AND FLOOD RISKS

4.1 Future Development Proposals

The current proposals are for the existing site to be redeveloped with a larger retail unit and amendments to the forecourt area to provide additional parking.

The site which is 1514m² in area is currently 97% impermeable with impermeable areas totalling 1465m². The new development will provide some small permeable landscaped areas resulting in the new developed site being 93% impermeable and therefore reducing the overall surface water drainage discharge from the site.

A drawing showing the existing and proposed impermeable areas for the site is attached at **Appendix A2**.

The proposed development will require a surface water drainage strategy that meets the approval of the Lead Local Flood Authority and, if required, Natural Resources Wales (in their capacity as a Consultee in the Planning Application process). We have reviewed options for achieving such a strategy as follows:

The Building Regulations 2010, Part H provides a hierarchal approach to the disposal of rainwater with the preferred options to discharge to an adequate soakaway or other infiltration system. If this is not possible, the next favoured option is to discharge to a watercourse. Only, if neither of these options is possible, should the site discharge to a sewer. We have briefly assessed each of these options as follows:-

4.2 Infiltration Drainage

BRE 365 Percolation testing was carried out on site on 5th April 2018

2No in-situ permeability tests were undertaken within trial pits, excavated to a depth of 2.5m, in order to establish the permeability of the sub soils. Neither of the percolation tests drained sufficiently to allow an infiltration rate to be calculated in accordance with BRE 365. Infiltration based drainage design is therefore not feasible on the site. A copy of the soakaway testing report is included in **Appendix D**.

No further testing could be carried out on the site due to there being insufficient room as a result of the proposed development and the adjoining properties and public highway.

4.3 Discharge to a Watercourse

There are no watercourses in close proximity to the site and so this option has not been considered any further.

4.4 Discharge to Existing Surface Water Sewer or Highway Storm water drain

There are no Welsh Water storm water sewers in the vicinity of the site and therefore this option cannot be considered any further.

Enquiries were made to establish the location and possible available capacity of any local Highway storm water drains. Despite best endeavours, no information could be obtained from the Highways Dept. However, the LLFA were able to provide evidence of storm water flooding which was as a result of insufficient highway drainage in the area. This option has therefore not been considered any further. **See Appendix C2.**

4.5 Discharge to the Combined Sewer Network.

A drainage survey of the existing developed site demonstrates that all storm water drainage is currently discharged to the local Welsh Water Combined sewer network. **See Appendix A3.**

A copy of the Welsh Water sewer records and correspondence is attached in **Appendix E.**

4.6 Proposals

We fully support the role of Sustainable Drainage Systems in new developments.

Due to very low permeability of the sub soils and the proposed development being a very small infill site located in an existing built up area, an infiltration based drainage solution is not feasible. There are no open watercourses into which a storm water drainage discharge can be made. There are no local storm water sewers and the local Highway storm water drainage network has been shown to already be flooding as a result of insufficient capacity. The only option left available is to continue to positively drain the site to the Welsh Water combined sewer network.

Protracted discussions were held with Welsh Water who eventually confirmed that a continued discharge of storm water drainage from the site would be acceptable to them into their combined sewer network at a rate not exceeding 5L/s. This will offer significant betterment to the receiving sewer network. A copy of the Welsh Water correspondence is attached at **Appendix E**

These proposals were then discussed with the Lead Local Flood Authority and having looked at the site and considered the site restraints, they confirmed that the proposals would be acceptable in principle.

It is therefore proposed to provide the new development with separate on site foul and storm water drainage networks, which will then combine at the site boundary and discharge to the Welsh Water combined sewer network.

Storm water drainage will be attenuated on site and flows off site restricted to a rate not exceeding 5L/s. A Quick Storage estimate has been carried out in Micro Drainage to establish the size of the attenuation volume required. A copy of these calculations is attached at **Appendix F**.

The intention will be to achieve the required attenuation and an offsite gravity discharge, but if necessary, the discharge may need to be pumped due to the level site. The calculations show that an attenuation tank constructed of crates with 95% voids would need to be 14m x 4m x 0.8m deep. This tank could be located below the car parking spaces located to the front of the retail unit.

The controlled discharge off site to the combined sewer will provide betterment to the receiving sewer network.

The demolition of the adjoining property will require the extinguishment of 3No adopted Welsh Water manholes and 2No lengths of combined sewer. A new drainage spur from the site will be constructed to connect to the remaining combined sewer network.

4.7 Exceedance

The proposed layout and detailed design will take into consideration the risk of exceedance events and overland sheet flow resulting from the failure of the storm water drainage network. The site will be engineered to accommodate overland flow routes to ensure that extreme event flood flows are conveyed through the site and directed away from buildings. As with the site pre development, the site is relatively level, but any overland flood flows will eventually fall out onto High Street. The road would act as a conduit carrying flood flows within the highway towards the northwest and southeast. There will be no additional risk to people or property as a result of this development as the new development will have a reduced impermeable area.

4.8 Vulnerability

Paragraph 5 within TAN 15, requires that all developments are located within their appropriate risk zones.

As a fuel filling station and retail outlet, this development is classified as a 'Less Vulnerable Development' located in Flood Zone A. This development meets with the requirements of the Guidance and therefore the Justification Test is not applicable.

5 CLIMATE CHANGE

In accordance with Lead Local Flood Authority requirements, the drainage network for the proposed commercial development will be based on a 1 in 100 year Design Storm event + 30% in peak rainfall intensities to allow for climate change.

6 ACCESS AND EGRESS

The development site is located within Flood Zone A and is not at any identifiable risk of flooding. Access and Egress to the site is therefore not considered to be an issue.

7 SURFACE WATER MANAGEMENT

7.1 General Surface Water Management Plan

The proposed drainage strategy is to not increase the rate and volume of existing surface water runoff, in order to not increase the downstream flood risk. As discussed previously there will be betterment due to the reduction in impermeable areas and the restricted off site discharge to the combined sewer.

Surface water from the proposed development will be collected by rain water pipes from roofs, and gully's with silt traps from the parking areas.

Trapped Gullies: Sediment sumps are to be installed on all rainwater down pipes; these will reduce flow velocities and allow larger particles to settle out, by gravitational separation.

Trapped Road Gullies: Sediment sumps are to be installed on all road gullies; these will reduce flow velocities and allow larger particles to settle out, by gravitational separation.

7.2 Construction Flood Risk Issues

To prevent flooding off site during the construction phase, it is proposed to investigate the excavation of catch pits and ditches in strategic locations. These will collect water and suspended sediments and allow the sediments to settle before the water is collected and transferred to a suitable point of discharge.

All facilities for storage of oils, fuels and other chemicals will be need to be stored within bunded areas that will have sufficient capacity of at least 10% greater than the maximum storage capacity.

Care will be taken when storing excavated materials from the construction site to prevent the possibility of pollution of watercourses, or silting of the sewer networks.

Prior to commencement of the works, the contractor will produce a method statement and agree it with the Planning Authority and Lead Local Flood Authority as required.

7.3 Maintenance of the Proposed System

The new on site drainage network will remain private. It will remain the responsibility of the developer who will ensure the long term maintenance of the network, up to the point of connection with the Welsh Water sewer network.

In order to ensure that the drainage systems can operate throughout the lifetime of the development, it is important that there is regular maintenance of the system. This prevents issues such as blockages and ensures that the system continues to operate as designed.

The operation and maintenance requirements for an attenuation tank are attached at **Appendix G**. The flow control type and its maintenance requirements will be decided in the detailed design.

7.4 Residual Flood Risk Issues

The proposed drainage system will require maintenance, and a failure to have in place a programme of maintenance work could lead to a failure of the system. Guttering, RWPs, gulley's etc. should be routinely inspected and cleared when required to ensure efficient operation. Extreme storm events are beyond what it is reasonably practicable to design for. As such, this is a residual risk that cannot be designed out.

8 FOUL DRAINAGE

Foul water drainage from the proposed development will discharge via gravity to the Welsh Water foul water sewer.

Welsh Water have confirmed their existing foul sewer has sufficient capacity to accommodate the anticipated foul flows from the proposed development. See **Appendix E** for Welsh Water correspondence.

9 CONCLUSIONS AND RECOMMENDATIONS

The site is within Flood Zone A, and has no identifiable risk of flooding.

This Flood Consequence Assessment (FCA) for the proposed development has been assessed in line with Planning Policy Wales and TAN 15. It is concluded that the development can be undertaken in a sustainable manner, without increasing the flood risk to existing properties.

Overland flood flow routes have been considered and it is not considered that the proposed development will put any additional risk onto third parties. Should there be an exceedance storm event or failure in the storm water drainage network, the site will be designed to ensure that water is carried away from the proposed building whilst ensuring that surrounding buildings are also not put at additional risk.

This Flood Consequence Assessment has shown that the proposed development would not create any increase in flood risk to the local area or downstream or indeed to the proposed development. The reduction in impermeable areas and controlled surface water drainage discharge to the combined sewer network will reduce the run off from the site and provide betterment to the receiving sewer network.

It is proposed that further detailed drawings will be produced once the main principals which underpin the strategy have been agreed by relevant stakeholders.

In conclusion, the development should not lead to an increased risk of either on site or offsite flooding, provided that development proceeds in line with the recommended mitigation measures within this report.



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Ringslade House
Broadway Road
Newton Abbot,
Devon TQ12 3EH
Tel: 01626 572 672
e-mail: admin@trueconsultant.co.uk
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APPENDIX A

Drawings

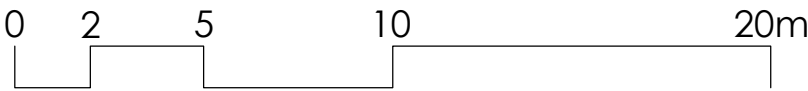
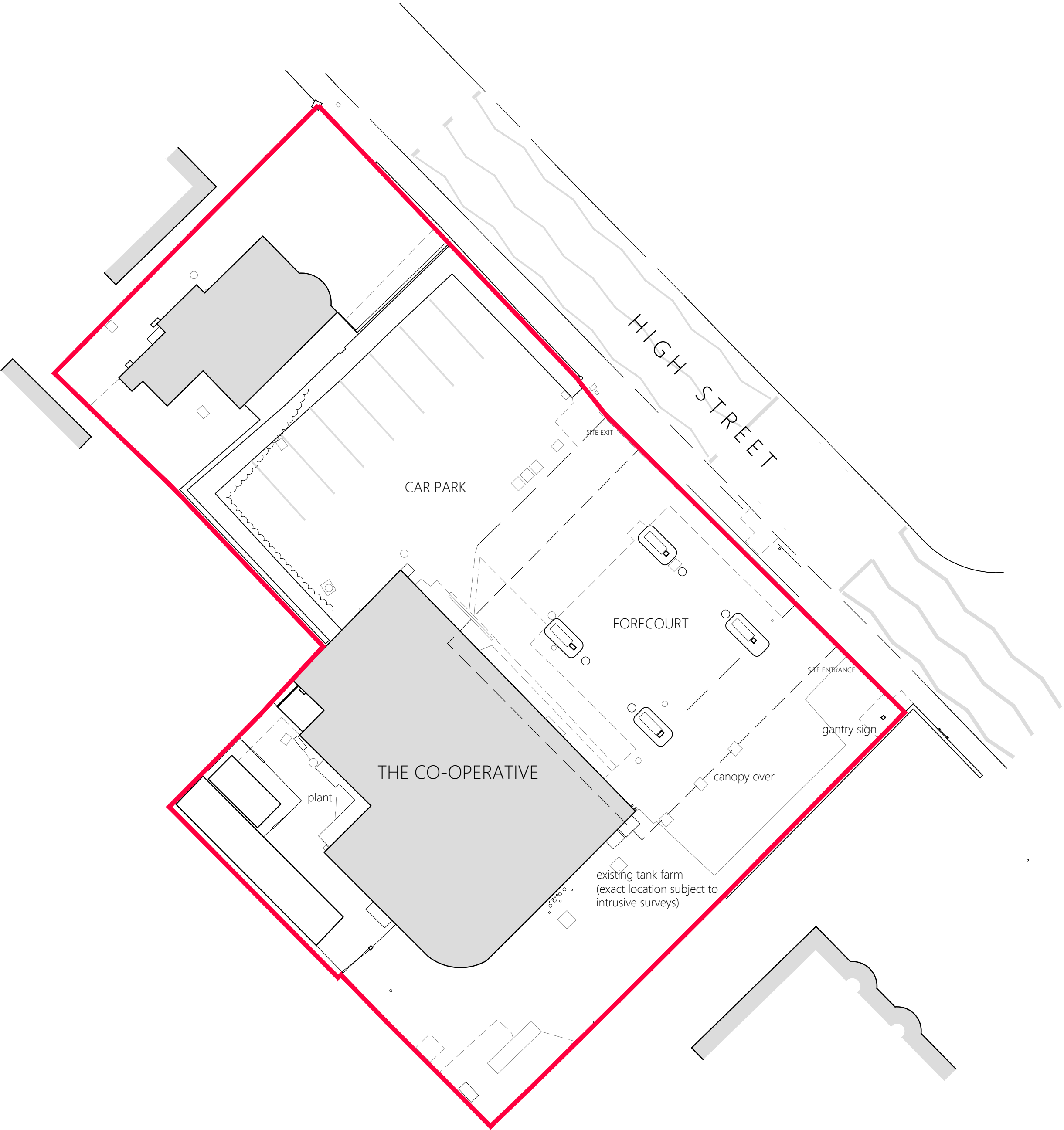
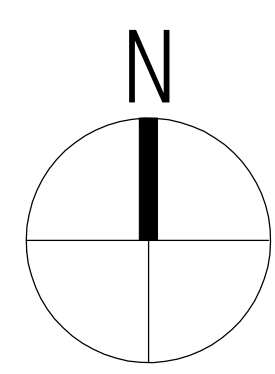


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Ringslade House
Broadway Road
Newton Abbot,
Devon TQ12 3EH
Tel: 01626 572 672
e-mail: admin@trueconsultant.co.uk
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APPENDIX A1

EXISTING SITE And PROPOSED SITE



Revision:

Client	THE CO-OPERATIVE ESTATES
Project	THE CO-OPERATIVE, HIGH STREET COEDPOETH, LL11 3UF

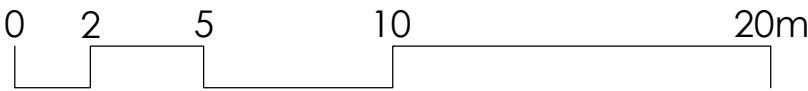
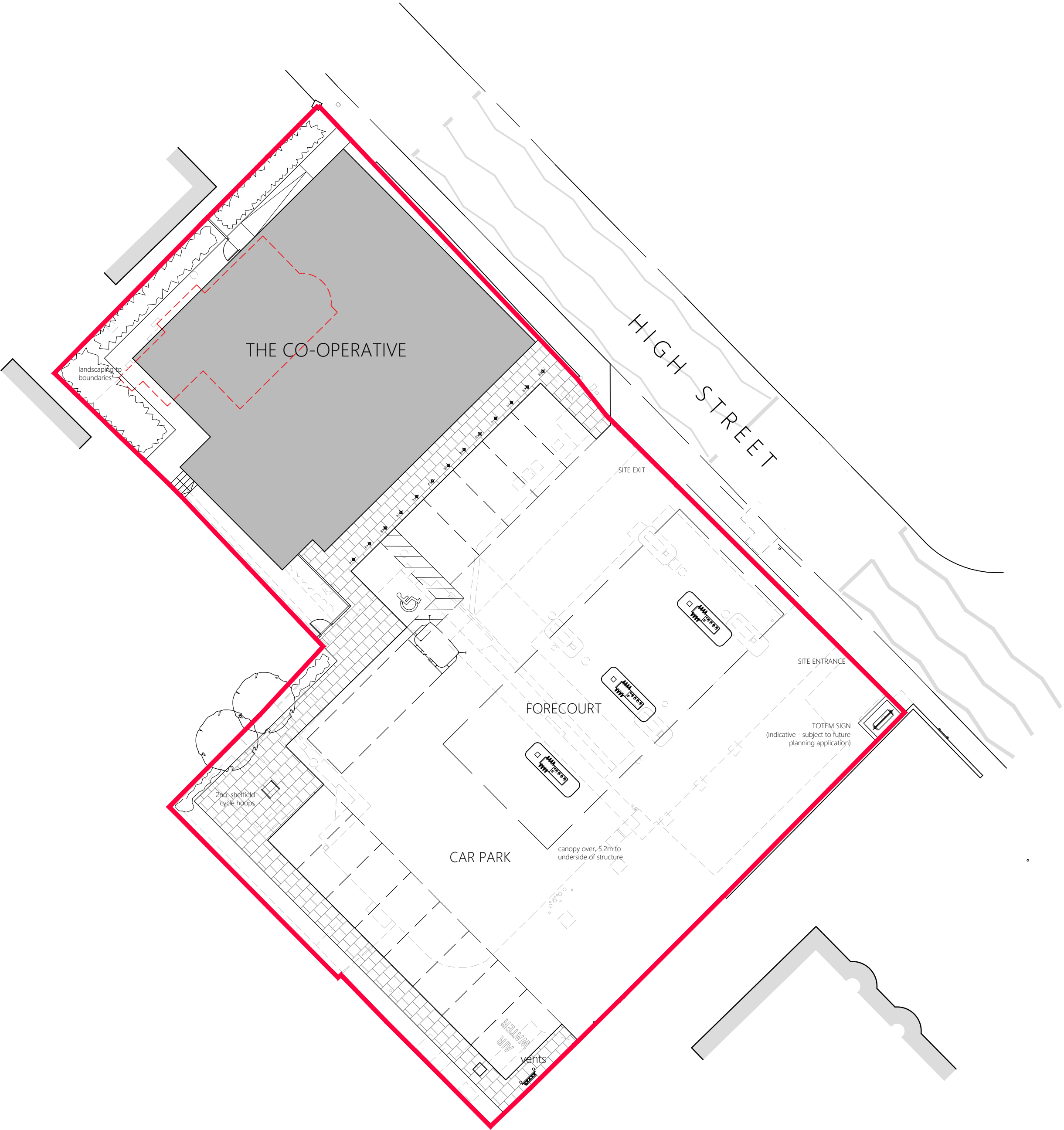
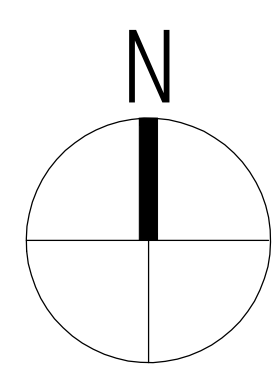
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Date	25/08/2017	Issuing Discipline	architecture	Revision	
Drawing number	6036(P)502				



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high street | stevenage | SG13UN | t: 01438 365 968
archersmanchester | citibase | 5th floor | 40 princess street |
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Revision:

Client	THE CO-OPERATIVE ESTATES
Project	THE CO-OPERATIVE, HIGH STREET COEDPOETH, LL11 3UF

Drawing title	PLANNING APPLICATION - PROPOSED SITE PLAN
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DRAFT

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Drawing number	6036(P)503				



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Ringslade House
Broadway Road
Newton Abbot,
Devon TQ12 3EH
Tel: 01626 572 672
e-mail: admin@trueconsultant.co.uk
www.trueconsultant.co.uk

APPENDIX A2

PRE AND POST DEVELOPMENT IMPERMEABLE AREAS



NOTES

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- Any discrepancies in dimensions or details on or between these drawings/specifications should be drawn to the attention of the structural engineer in writing for clarification
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PRELIMINARY ISSUE

Mark	Date	By	Chk'd	Revision	Notes
P1	04/04/18	JAT	DJS		PRELIMINARY ISSUE

Client
WILLIAM SOUTHERN LTD

Project Title
CO-OP COEDPOETH

Drawing Title
EXISTING AND PROPOSED IMPERMEABLE AREAS

Client
Ringslade House
Broadway Road
Newton Abbot
TQ12 3EH
Tel: 01626 572 672
admin@trueconsultant.co.uk
www.trueconsultant.co.uk

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Rev. P1	



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Ringslade House
Broadway Road
Newton Abbot,
Devon TQ12 3EH
Tel: 01626 572 672
e-mail: admin@trueconsultant.co.uk
www.trueconsultant.co.uk

APPENDIX A3

EXISTING SITE DRAINAGE



GENERAL NOTES

Do not scale off this drawing.

Layout has been prepared from Met Geo Environmental topographical & subscan survey 13016-150 dated November 2015.

LEGEND

> SW > SW	Surface Water Drain
> SW > SW	Surface Water Sewer
> BSW > BSW	Brown Surface Water Drain
> FW > FW	Foul Water Drain
> FW > FW	Foul Water Sewer
> CD > CD	Combined Sewer

SITE DRAINAGE

The site has a combined gravity outfall, outfalling through the neighbouring private property.

There is also a combined drain entering the property from the south west.

Rev	Date	Comments
STATUS		RECORD DRAWING
SITE LOCATION		CO-OP PFS COEDPOETH High Street, Wrexham Clwyd, LL11 3UF
TITLE		POLLUTION PREVENTION GUIDELINES INCIDENT RESPONSE PLANNING - PPG21

The co-operative

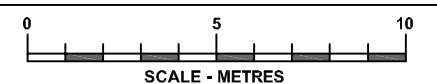
JENNINGS DESIGN LIMITED

York House, Valley Court, Canal Road,
Bradford, West Yorkshire, BD1 4SP.

TEL. No. 01274 395422
FAX. No. 01274 395427
E-mail office@jen305.com

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Devon TQ12 3EH
Tel: 01626 572 672
e-mail: admin@trueconsultant.co.uk
www.trueconsultant.co.uk

APPENDIX B

Intrusive Site Investigation Report Extracts

ENVIRONMENTAL ASSESSMENT REPORT

**Petrol Coedpoeth,
High Street, Coedpoeth, Wrexham**

Report No: CP17129 CL 001

March 2017

Client: The Co-Operative Group Ltd

Report Prepared By:



Greg Ross

Report Reviewed By:



James Skinner

Environmental Assessment Report – Petrol Coedpoeth, High Street, Coedpoeth

Environmental Investigation – Summary				
Sitework Completed				
Date investigation completed:	6 th – 7 th February 2017		No. boreholes constructed / maximum depth drilled	
Date of groundwater monitoring visit:	14 th February 2017		No. monitoring wells installed / maximum depth	
Site Sensitivity (based on desk-top information)				
Geology and Hydrogeology	No superficial deposits identified			
	Pennine Lower Coal Measures		Secondary (Class A) Aquifer	
Source Protection Zone:		No	Nearest Surface Water:	River Clywedog 230m SW
Encountered Hydrogeology/Geology				
Groundwater	Strike between 1.7 and 4.0m / Resting between 2.7 and 5.9m. Not continuous across site - groundwater encountered in three boreholes only.			
Soil Stratigraphy	Geological Unit	From	To	Description
	Made Ground	0.0	~1.2	SOFT to FIRM dark brown or black gravelly CLAY OR MEDIUM DENSE brown clayey GRAVEL with occasional large brick fragments.
	Glacial Till	~1.2	~2.5	FIRM to STIFF orange brown grey mottled CLAY with frequent fine gravel
	Pennine Lower Coal Measures	~2.5	>6.0	STIFF to VERY STIFF grey brown friable sandy CLAY OR WEAK to MODERATELY WEAK grey highly weathered MUDSTONE with occasional bands of black coal measures and sub-angular grey gravel.
Results of Environmental Investigation				
Environmental Assessment – Summary of Conclusions:	➤ We have identified low concentrations of petrol range hydrocarbons in shallow Made Ground and underlying shallow soils in BH3. Low concentrations of waste oil range hydrocarbons were identified in a single soil sample from BH4. We detected trace concentrations of various PAH compounds in soil samples obtained from BH2 and BH4. ➤ Elevated concentrations of lead were identified in underlying shallow Made Ground recovered from BH1, BH2, BH4 and BH5. Elevated concentrations of zinc were also reported from BH2 and BH4. ➤ Elevated concentrations of hydrocarbons, generally consistent with waste oil and possibly weathered diesel, were identified in the groundwater sample collected from BH4. No detectable hydrocarbons were identified in the other groundwater samples obtained (BH5 and MW1). ➤ The results of our Generic Quantitative Risk Assessment indicates that the concentrations of hydrocarbons identified in underlying soils and groundwater do not pose a potential long-term risk to future commercial site users. We do not consider offsite residential or environmental receptors to be at significant risk as we have not identified an active migration pathway from the site. On this basis, we consider the site to be suitable for continued commercial use.			
Please refer to our report for our conclusions and recommendations in full. Your attention is drawn to the Notice to Interested Parties included as Attachment One.				

Environmental Assessment Report – Petrol Coedpoeth, High Street, Coedpoeth

Site Investigation - Summary of Recommendations for Redevelopment Works		
Temporary works - slope stability	Foundation excavations likely to be formed within:	Granular Made Ground / Glacial Till (clay) / Coal Measures (clay / mudstone)
	Likely to remain stable for short periods without support or being battered back	Yes
	Note: We recommend that a detailed inspection of the side slopes be carried out in order to assess fully any support measures required.	
	We encountered weathered bedrock (Lower Pennine Coal Measures units) from around between 0.9m and 2.5m depths under the site. We were able to construct a borehole to a maximum depth of 7.2m using direct-push drilling methods. We consider driven sheet piles are likely to penetrate the underlying soils to sufficient depth to form a support measure for the tank farm excavation, although localised mudstone horizons could be present. Consideration of alternative support measures is recommended.	
Temporary works - De-watering	Anticipated depth to standing groundwater	Variable - ~2.5m - ~5m. Not continuous across site.
	Anticipated permeability	Low
	Dewatering likely to be required?	Possible - below ~3m
	Waste water likely to be impacted with hydrocarbons?	Possibly - impacted groundwater in BH4 only.
Disposal of Excavated Spoil	Soil / leachate samples analysed for compounds within Subadra Waste Acceptance Criteria Suite?	No
	Excavated soils from the site are likely to be classified as?	Non-Haz to Hazardous
	Note: We recommend that we classify all potentially impacted soils prior to disposal. All waste soils and fill must be disposed of at an appropriately licensed disposal site. We have not completed a detailed assessment of underlying Made Ground for the presence of asbestos containing materials although we have not identified detectable asbestos the samples we have submitted for asbestos screening.	
Additional Comments/Recommendations		
Additional comments regarding re-development works:	As with any petrol filling station, additional areas of hydrocarbon impacted soil may be encountered during redevelopment works. In particular these include areas we have been unable to investigate due to the restrictions of working on an operational filling station (i.e. site buildings, petroleum installation and services). We therefore recommend that verification sampling of excavations be undertaken during the site demolition and decommissioning works to confirm no additional contamination is present. The site has been a filling station and garage for several decades. It is therefore The site has been a garage / petrol station since at least the 1960s and we understand that the current petroleum installation dates from before 1988. Given the age of the site we consider it is possible that there could be further abandoned tanks remaining under the forecourt.	
Please refer to our report for our recommendations in full. Your attention is drawn to the Notice to Interested Parties included as Attachment One.		