R G PARKINS
Meadowside | Shap Road | Kendal | Cumbria | LA9 6NY
Tel:01539 729393
Email: kendal@rgparkins.com

# Drainage Strategy

## New Development – Arlecdon Parks Road, Arlecdon

Stewart Richardson

Ref: K40828.DS/001

| Version | Date | Prepared By | Checked By | Approved By |
|---|---|---|---|---|
| Original | 20th December 2023 | C. Abram | O. Sugden | O. Sugden |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## INDEMNITIES

This report is for the sole use and benefit of Stewart Richardson and their professional advisors. RG Parkins & Partners Ltd will not be held responsible for any actions taken, nor decisions made, by any third party resulting from this report.

RG Parkins & Partners Ltd are not qualified to advise on contamination. Any comments contained within this report with regards to contamination are noted as guidance only and the Client should appoint a suitably qualified professional to provide informed advice. The absence of any comments regarding contamination does not represent any form of neglect, carelessness, or failure to undertake our service.

## COPYRIGHT





Registered Office: RG Parkins & Partners Ltd, Meadowside, Shap Road, Kendal, LA9 6NY
Registered in England & Wales - Company number 04107150

## CONTENTS

## FIGURES



## TABLES

## GLOSSARY OF TERMS

| | |
|---|---|
| AEP | Annual Exceedance Probability |
| AOD | Above Ordnance Datum |
| BGL | Below Ground Level |
| BGS | British Geological Society |
| CC | Climate Change |
| CC | Cumberland Council |
| DSM | Digital Surface Model |
| DTM | Digital Terrain Model |
| EA | Environment Agency |
| FEH | Flood Estimation Handbook |
| FFL | Finished Floor Level |
| FRA | Flood Risk Assessment |
| GIS | Geographical Information System |
| LiDAR | Light Detection and Ranging |
| LLFA | Lead Local Flood Authority |
| NPPF | National Planning Policy Framework |
| OS | Ordnance Survey |
| RGP | RG Parkins & Partners Ltd |
| SFRA | Strategic Flood Risk Assessment |
| SuDS | Sustainable Drainage System |
| UU | United Utilities |

# 1. INTRODUCTION

## 1.1 BACKGROUND

This report has been prepared by R. G. Parkins & Partners Ltd (RGP) for Stewart Richardson in support of a proposal to construct a new residential development in Arlecdon, Cumbria.

RGP has been appointed to undertake a Surface and Foul Water Drainage Strategy in accordance with the National Planning Policy Framework (NPPF) [1] [2] to support a planning application that fulfils the requirements of the Local Planning Authority, Environment Agency and the Sewerage Undertaker.



Registered Office: RG Parkins & Partners Ltd, Meadowside, Shap Road, Kendal, LA9 6NY
Registered in England & Wales - Company number 04107150

# 2. SITE CHARACTERISATION

## 2.1 SITE LOCATION

The site is located off Arlecdon Parks Road (A5086), Arlecdon, Cumbria at National Grid Co Ordinates 305025E 518660N.

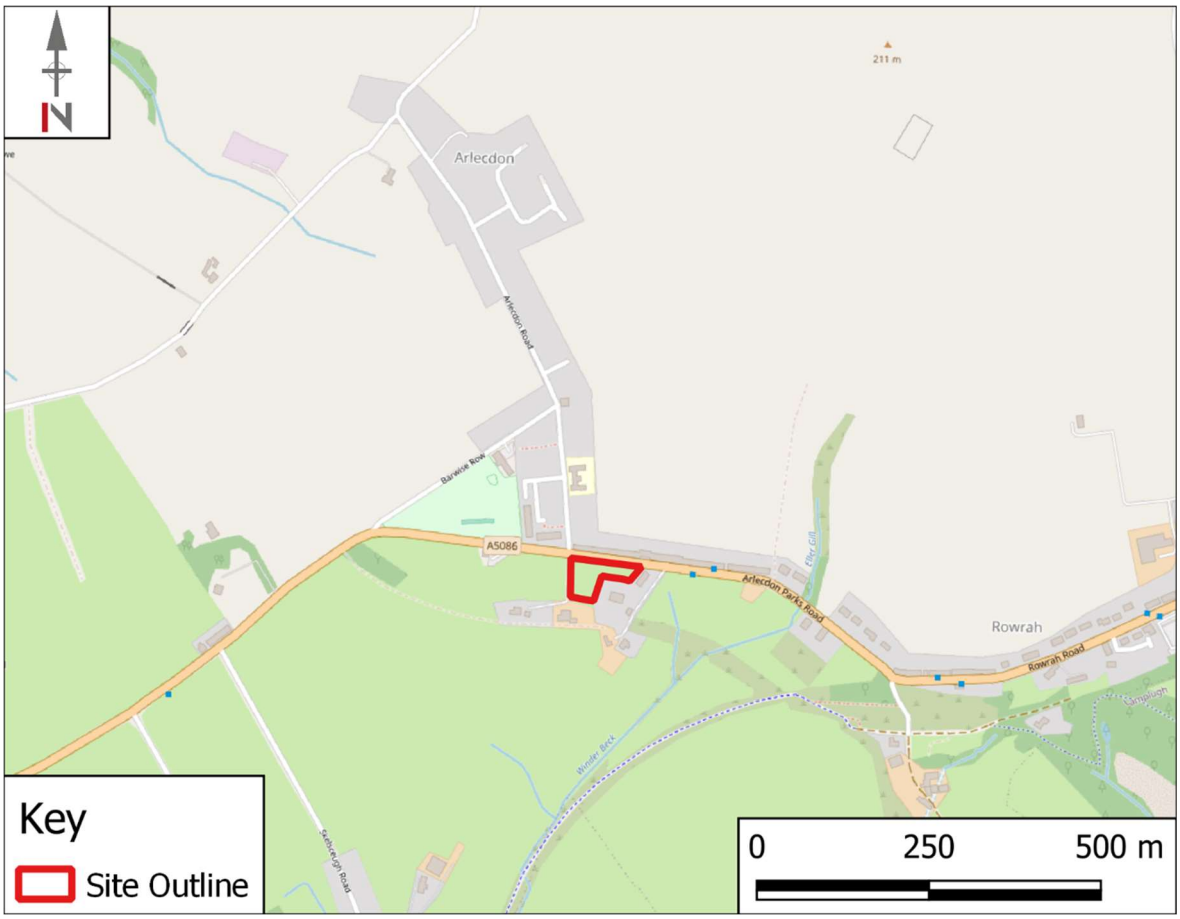



***Figure 2.1 Site Location***

## 2.2 SITE DESCRIPTION

The site is classified as greenfield and covers approximately 0.35 ha (3,500 m²) and at present is unused. The site is bounded by Arlecdon Parks Road to the north, an access road to the west, with neighbouring residential premises forming the eastern and southern boundaries.

A topographical survey of the site and surroundings is available and this has been carried out to a local arbitrary datum of 100m taken from the corner of an existing concrete slab located at the north west corner of the site. Based on this level, topographically the site typically slopes from northwest to southeast, with levels ranging between 100.00 mAOD in this location down to lows of approximately 93.50 mAOD and 92.50mAOD at the southern and eastern extents respectively.

The site is currently accessed from an existing farm gate off a private access track to the south, with future access proposed to be directly from Arlecdon Parks Road.

## 2.3 GEOLOGY & HYDROGEOLOGY

British Geological Survey (BGS) [4] and Land Information Systems (LandIS) [5] mapping indicates the site is underlain by the geological sequences outlined in Table 2.1. The EA Groundwater Vulnerability Map [6] indicates the nearest Groundwater Source Protection Zone is a Zone 3 'Total catchment' which is situated approximately 1.5 km north of the site. The development site overlies a major aquifer with 'Medium' vulnerability.

***Table 2.1 Site Geological Summary***

| Geological Unit | Classification | Description | Aquifer Classification |
|---|---|---|---|
| Soil | Soilscape 6 | Freely draining slightly acid loamy soils | N/A |
| Drift | No information | N/A | N/A |
| Solid | Pennine Lower Coal Measures Formation | Mudstone, siltstone and sandstone | Summary: Principle B |

Although the above soil conditions are recorded on desktop data it is possible that at this location part of the site's underlying ground is comprised of fill.

## 2.4 HYDROLOGY

The nearest named watercourse is Winder Beck located approximately 200m southeast of the site.

An unnamed ditch that feeds into Winder Beck is located in an agricultural field approximately 100m east of the site, this ditch has been proven to be the discharge point for other surface water features from the area, notably via a stone culvert receiving highways drainage from the A5086. It also receives runoff from the nearby Combined Sewer Overflow point in severe conditions.

## 2.5 EXISTING SEWERS

Reference to the United Utilities sewer records (Appendix C) indicates there is a 225-mm diameter combined public sewer crossing the main road and located adjacent to the open surface water ditch. Connecting manholes are present in Arlecdon Parks Road with a combined sewer overflow located near and discharging to the head of the unnamed open ditch.

It is also known there are highways drains present in the main road and it is understood from historic correspondence with the council Highways Authority that this suffers from capacity issues.

Public water mains are also present in the road servicing nearby dwellings within the vicinity of the site.

## 2.6 GROUND INVESTIGATION

Ground investigation has previously been undertaken at the site at outline planning stage and based on the poor rates of infiltration observed and coupled with the saturated ground

encountered, disposal via infiltration has been ruled out as a viable disposal solution for surface water.

## 2.7 DRAINAGE SURVEY

RGP have been provided with the results of a CCTV drainage survey carried out by SK Drainage Solutions in June 2020.

This has confirmed the presence of the surface water and combined sewer drainage in this area.

The survey also verified the presence of the stone culvert conveying flows from the highway drainage to outfall to the open ditch. This culvert was found to be in poor condition.

The investigations also proved the combined sewer overflow discharges to the same ditch.

The Drainage Survey Report is included in Appendix D for reference.

## 2.8 HISTORIC CORRESPONDENCE.

RGP have also been provided with Copeland Borough Council's Planning Panel Report (Planning Ref: 4/18/2504/0O1) issued when determining the outline planning approval on 16/12/2020 which is included in Appendix E for reference.

This contains historic correspondence/comments from both the Lead Local Flood Authority and the local Flood and Coastal Defence Engineer for this area, also included are responses from CC Highways Authority and United Utilities with respect to drainage.

Notably these include the provision of a permanent perimeter bund and filter drain and a temporary cut-off land drain to mitigate run-off from the site both during construction and for the lifetime of the development.

Recommendations have also been made for the respective statutory bodies/riparian owners to make improvements to the receiving foul and surface water drainage features in the catchment to improve existing capacity issues downstream of the site outside of the applicants control.

These capacity issues have resulted in the site being unable to utilise connections to nearby existing public drainage networks resulting in the requirement to provide new separate surface and foul water drainage runs in the road to service the development and convey flows downstream.

The drainage strategy has therefore endeavoured to incorporate these points into the development design where practicable.

# 3. SURFACE WATER DRAINAGE STRATEGY

## 3.1 INTRODUCTION

The principal aim of the following drainage strategy is to design the development to avoid, reduce and delay the discharge of rainfall to public sewers and watercourses in order to protect watercourses and reduce the risk of localised flooding, pollution and other environmental damage.

In order to satisfy these criteria this surface water runoff assessment and drainage design has been undertaken in accordance with the following reports and guidance documents:

- SuDS Manual, CIRIA Report C753, 2015[7]
- Code of Practice for Surface Water Management, BS8582:2013, November 2013[8]
- Rainfall Runoff Management for Developments, Defra/EA, SC030219, October 2013[9]
- Designing for Exceedance in Urban Drainage – Good Practice, CIRIA Report C635, 2006[10]
- Flood Estimation Handbook (FEH)[11]
- Flood Studies Report (FSR), Volume 1, Hydrological Studies, 1993[12]
- Flood Studies Supplementary Report No 14 (FSSR14), Review of Regional Growth Curves, 1983[13]
- Flood Estimation for Small Catchments, Marshall & Bayliss, Institute of Hydrology, Report No. 124 (IoH 124), 1994[14]
- Department for Environment, Food and Rural Affairs, Non-Statutory Technical Standards for Sustainable Drainage Systems, March 2015 [15]
- Water UK, Design and Construction Guidance for Foul & Surface Water Sewers Offered for Adoption Under the Code for Adoption Agreements for Water and Sewage Companies Operating Wholly or Mainly in England, Approved Version 2.0, 10 March 2020 [16]

The following assessment and drainage strategy are based on the latest site layout plan by Martin Cuthell Architectural Services No. 23.07-01b.

Any alterations to the site plan resulting in changes to impermeable areas will require the drainage strategy to be revisited.

## 3.2 SITE AREAS

To support the exploration of options for site drainage, the spatial extent of different types of proposed land cover on the site have been measured. Table 3.1 shows the measured proposed land cover areas. The highest percentage is green and landscaped areas at 35% of the total site area. Roof areas cover 21%, road area 23% and driveway areas 13%.

*Table 3.1 Land Cover Areas*

| Land Cover | Area | | Percentage of total site area |
|---|---|---|---|
| | m² | Ha | |
| Total housing roof area | 730.9 | 0.073 | 21% |
| Total parking and paved area | 804.0 | 0.080 | 23% |
| Total road area | 470.0 | 0.047 | 13% |
| Detention basin area | 277.6 | 0.028 | 8% |
| Garden & landscaped areas | 1242.5 | 0.124 | 35% |

The site can be subdivided into land cover that could be permeable and that which could be impermeable. Potential impermeable areas are regarded as housing, parking, roads, driveways.

All other areas are regarded as having a permeable surface. Table 3.2 gives the areas of potentially permeable and impermeable land cover, and this shows that impermeable areas could cover 65% of the site and permeable areas 35%.

*Table 3.2 Area of Potentially Impermeable & Permeable Land Cover*

| Land Cover | Area | | Percentage of total site area |
|---|---|---|---|
| | m² | Ha | |
| Total impermeable area | 2282.5 | 0.228 | 65% |
| Remaining permeable area | 1242.5 | 0.124 | 35% |

## 3.3 SURFACE WATER DRAINAGE DESIGN PARAMETERS

The surface water drainage system has been designed on the following basis using the modified rational method and a generated rainfall profile:

### 3.3.1 CLIMATE CHANGE

Projections of future climate change indicate that more frequent short-duration, high intensity rainfall and more frequent periods of long-duration rainfall are likely to occur over the next few decades in the UK. These future changes will have implications for river flooding and for local flash flooding. These factors will lead to increased and new risks of flooding within the lifetime of planned developments.

Climate change guidance is issued by the Environment Agency and outlines the anticipated changes to extreme rainfall intensity. The EA have provided a peak rainfall online map showing the anticipated changes in peak rainfall intensity across the UK. Climate change allowances are now provided on a catchment-by-catchment basis.

The site falls within the South West Lakes Management Catchment. Table 3.3 outlines the EA guidance for this catchment, for the anticipated design life of the proposed development.

In line with current guidance and for conservative design, a 50% allowance shall be used within this assessment.

***Table 3.3 South West Lakes Management Catchment Peak Rainfall Allowances (1.0 AEP)***

| Management Catchment (1.0%AEP) | Central Allowance (%) | Upper End Allowance (%) |
|---|---|---|
| 2050s | 30 | 45 |
| 2070s | 35 | 50 |

### 3.3.2 URBAN CREEP

BS 8582:2013[8] outlines best practice with regard to Urban Creep. Although not a statutory requirement, future increase in impermeable area due to extensions and introduction of impervious positively drained areas has been considered.

An uplift of 10% on impermeable areas associated with plots only (excluding roads) has been applied to the contributing area.

### 3.3.3 PERCENTAGE IMPERMEABILITY (PIMP)

The percentage impermeability (PIMP) for all impermeable areas is modelled as 100%. The entirety of the impermeable areas is to be positively drained.

### 3.3.4 VOLUMETRIC RUNOFF COEFFICIENT (CV)

The volumetric runoff coefficient describes the volume of rainfall which runs off an impermeable surface following losses due to infiltration, depression storage, initial wetting and evaporation. The coefficient is dimensionless. Default industry standard volumetric runoff coefficients are 0.75 for summer and 0.84 for winter and are typically used for design.

However, based on recent local authority feedback a Winter Cv value of 1.0 has been applied in this case for additional design redundancy.

### 3.3.5 RAINFALL MODEL

The calculations use the REFH2 unit hydrograph methodology in line with best practice as outlined in the SuDS Manual [7]. The calculations use the most up to date available catchment descriptors (2022) provided by the Centre for Ecology and Hydrology Flood Estimation Handbook [11].

## 3.4 PRE-DEVELOPMENT RUNOFF ASSESSMENT

The site is currently brownfield and therefore relatively impermeable. Currently surface water discharges unattenuated to the sea.

For completeness greenfield runoff calculations have also been undertaken. As the site covers an area of less than 200 ha, (2.5 ha) the Greenfield calculations have been undertaken in accordance with methodology described in IoH 124 [14]. For catchments of less than 50 ha the Greenfield runoff rate is scaled according to the size of the catchment in relation to a 50-hectare site.

Full details of the calculations and the methodology for deriving the Peak Rate of Runoff are in included in Appendix C. A summary of the results is included in Table 3.4.

***Table 3.4 Pre-Development Peak Runoff Rates***

| Rate of Runoff (l/s) | |
|---|---|
| Event | Greenfield |
| Q1 | 2.1 |
| QBAR | 2.4 |
| Q10 | 3.3 |
| Q30 | 4.1 |
| Q100 | 5.0 |
| Q100 + 50% CC | 7.5 |

Without attenuation or infiltration, the proposed development would increase the Rate of Runoff from the developed areas of the site.

## 3.5 SURFACE WATER DISPOSAL

Surface water disposal has been considered in line with the hierarchy outlined in the SuDS Manual[7]. The approach considers infiltration drainage in preference to disposal to watercourse, in preference to discharge to sewer.

### 3.5.1 INFILTRATION

In-situ permeability testing was undertaken as part of the ground investigation for the outline planning application at this site (See Section 2.6) and it was concluded that disposal of surface water via. soakaways would not form an effective drainage solution for this site.

On this basis it is therefore considered that disposal of surface water using a full infiltration-based SuDS is not viable for this proposed development and an attenuation-based strategy should be progressed.

### 3.5.2 POSITIVE DRAINAGE

The outline drainage strategy approved at outline planning stage was for a positively drained surface water system. The following strategy has therefore been designed on this overall premise but refined to incorporate changes to the site layout.

It is therefore proposed that the development site will require a positive drainage solution. Runoff will be stored and attenuated to match the pre-development greenfield QBAR rates, with controlled discharge directed from suitably sized attenuation structures for the defined site catchment areas via. new surface water conveyance pipework down Arlecdon Parks Road for connection to an existing surface water manhole prior to ultimate disposal via and existing stone culvert to the existing drainage ditch located approximately 100 m away in close proximity to the eastern site boundary.

## 3.6 SURFACE WATER DRAINAGE DESIGN

The proposed surface water network serving the entire developable area of the site has been modelled using Causeway Flow (results are included in Appendix B).

The drainage design has been sized to store a future 1% AEP event of critical duration without any flooding. Future climate change (50%) and urban creep (10% to housing roof areas only) is accounted for within the calculations.

It is proposed that all impermeable site areas i.e. roof, driveway and road areas will drain via. gravity through a network of pipes and chambers into a shared private detention basin located in the natural respective low point of the site.

The new detention basin will be formed as a permanent feature in an area designated as open space and will be designed to incorporate shallow, grassed slopes to provide important amenity and biodiversity benefits to the development. As the site is known to have saturated ground and assumed high groundwater levels, the basin construction will also need to incorporate an underdrain positioned underneath the impermeable liner to direct groundwater away from the basin footprint and mitigate against the potential of the liner being susceptible to flotation in extreme groundwater conditions.

Roof water, driveway and road runoff will connect directly into the surface water pipe network upstream of the detention basin, with inspection and manhole chambers utilised to route the new pipework to suit the proposed development layout and allow for future inspection and maintenance. Proposed ground levels will need to fall consistently depending on which area they are located, in order to enable gravity connections to the drainage system.

Silt traps will be located upstream of the detention basin, which will provide surface water treatment and access for maintenance. Silt traps isolate silt and other particles by encouraging settlement into sumps, preventing ingress into SuDS components.

Approx 40m of new pipework will need to be installed under Arlecdon Parks Road to facilitate connection to the existing surface water drainage outlet in this vicinity. It is understood this is proposed to remain private subject to CC Highways approval.

Numerous existing utilities services are known to be present in the vicinity and service record information has been consulted to dictate the alignment of the proposed new drainage in the main road to avoid clashes. The location and depth of these utilities should be verified prior to construction and the alignment of the drainage altered to suit if required.

For further detail refer to the Drainage Layout Plan included in Appendix A.

## 3.7 VOLUMETRIC STORAGE

A storage assessment has been undertaken for the Q100+50% CC storm event and the detention basin has been designed with sufficient capacity to contain flows without causing flooding, the results are provided in Table 3.5.

*Table 3.5 Attenuation Storage Volumes*

| Site Area | Impermeable Catchment Area Including UC ($m^2$) | Storage Volume to TWL ($m^3$) | Development Controlled Discharge Rate QBAR (l/s) |
|---|---|---|---|
| Proposed Impermeable Area | 2,260 | 256 | 2.4 |

Note: TWL - Top Water Level for the Q100 + 50%CC event

## 3.8 OTHER BENEFITS OF DEVELOPMENT

The development site in its current agricultural form is sparse grazing pasture on sloping land, underlain by relatively impermeable soil, provides little in the way of natural flood defence or attenuation to overland flows and stormwater runoff. The land in its current form also lacks any meaningful biodiversity or amenity value and provides limited benefits to the surrounding community.

It is envisaged that the proposed development site will tie into the existing topography via the careful design of engineered slopes and retaining walls. Slopes, gardens and open space areas will be carefully landscaped using a variety of plants, shrubs and trees with clean imported granular topsoil, providing a net gain in biodiversity and enhanced storage/protection against overland flows. Any retaining walls will be positively drained using heel drains with discharge into the main surface water system.

As such the existing hydraulic regime of the site will be modified whereby overland and subsurface flows will be intercepted, attenuated, and re-directed by below ground structures, positive drainage and service trenches.

Hydraulic gradients and velocities will be reduced, and the risk of downstream flooding would not be increased. Any surface emergence of any groundwater on-site will be intercepted by land drainage systems and directed away from existing dwellings.

## 3.9 DESIGNING FOR LOCAL DRAINAGE SYSTEM FAILURE

In accordance with the general principles discussed in CIRIA Report C635 – Designing for Exceedance in Urban Drainage [13] the proposed surface water drainage, where practical, should be designed to ensure there is no increased risk of flooding on the site or elsewhere as a result of extreme rainfall, lack of maintenance, blockages or other causes. These measures are discussed below.

**Surface Storage & External Levels** – where possible driveway/car parking areas will be designed to offer additional surface water storage volume and conveyance of flood water should the SuDS and drainage system fail, flood or exceed capacity. Where appropriate, the kerb lines will be raised to channel surface water runoff back into the drainage system or onto the existing highway.

An overland flow route is proposed to direct any exceedance that may collect at the low point of the site in the road towards a filter drain running along the boundary perimeter of the site. As this area is at a raised level in relation to surrounding property boundaries it is proposed to incorporate

a small 300 mm high earth bund along the perimeter of the field to contain any such exceedance flows and ensure interception occurs in the adjacent linear drain.

**Drainage Contingency** – the sustainable drainage systems have been conservatively designed to attenuate a 100-year design storm including a 50% allowance for climate change, using a Cv value of 1.0. The drainage system will also provide capacity for lower probability (greater design storm events) which are not critical duration.

**Building Layout & Detail** – the dwellings will be designed and situated to ensure that they are not at risk of flooding from overland flow. The finished floor and threshold levels of the proposed new dwellings will be set above the external levels, and external footpaths will fall away from the dwellings, ensuring that any flood water runs away from, rather than towards the properties.

**Blockage and exceedance** – In the unlikely case of exceedance or blockage of the detention basins, associated silt traps and/or flow control chambers, spills would occur from the lowest access cover around the properties. Exceedance flows shall be retained on site within the drainage system as far as practical and in the case of extreme events site levels will be set to divert any exceedance flows to fall towards and disperse into the more permeable green space areas where they would be contained and intercepted by positive land drainage which will discharge exceedance flows into the surface water conveyance pipe for disposal to the watercourse. A high-level overflow on the flow control chamber should prevent any spills from these manhole covers during exceedance events, however in the unlikely event that this or the basin were to overtop, exceedance flows would be directed towards and intercepted by the same perimeter filter drain via. overflow spillways and channels where they would be contained and routed away from the site towards the outfall points.

## 3.10 SURFACE WATER QUALITY

The treatment of surface water is not a statutory requirement. Water quality remains a material consideration but there are no prescriptive standards to be imposed in terms of treatment train management. In the absence of a design standard, the SuDS manual has been used which outlines best practice.

Pollutants such as suspended solids, heavy metals and organic pollutants may be present in surface water runoff, the quantity and composition of the runoff is highly dependent upon site use. For housing developments, the pollutant load is very low.

The SuDS Manual[7] outlines best practice with regards to treatment of surface water by SuDS components prior to discharge to the environment. SuDS components can be effective in reducing the concentrations of pollutants within the surface water discharged and therefore environmental impact of the development. SuDS components may be installed in series to form a treatment train to treat the runoff.

The simple index approach as outlined in the SuDS manual has been used to assess the pollution hazard indices and proposed treatment components, the calculations are included in Appendix B.

For the three categories of runoff areas served by the drainage system, roof areas, residential parking and residential roads, treatment is proposed by directing all surface water runoff via. detention basins before discharge off site.

Tables 3.6 – 3.8 summarise the pollution hazard and mitigation indices for this type of runoff and show that adequate treatment of surface water runoff is provided by the use of detention basins.

***Table 3.6 Pollution Hazard & Mitigation Indices - Roof Areas***

| Indices | Suspended Solids | Metals | Hydrocarbons |
|---|---|---|---|
| Pollution Hazard | 0.2 | 0.2 | 0.05 |
| Pollution Mitigation | 0.5 | 0.5 | 0.6 |
| Treatment Suitability | **ADEQUATE** | **ADEQUATE** | **ADEQUATE** |

***Table 3.7 Pollution Hazard & Mitigation Indices - Residential Parking***

| Indices | Suspended Solids | Metals | Hydrocarbons |
|---|---|---|---|
| Pollution Hazard | 0.5 | 0.4 | 0.4 |
| Pollution Mitigation | 0.5 | 0.5 | 0.6 |
| Treatment Suitability | **ADEQUATE** | **ADEQUATE** | **ADEQUATE** |

***Table 3.8 Pollution Hazard & Mitigation Indices - Residential Roads***

| Indices | Suspended Solids | Metals | Hydrocarbons |
|---|---|---|---|
| Pollution Hazard | 0.5 | 0.4 | 0.4 |
| Pollution Mitigation | 0.5 | 0.5 | 0.6 |
| Treatment Suitability | **ADEQUATE** | **ADEQUATE** | **ADEQUATE** |

## 3.11 OPERATIONS & MAINTENANCE RESPONSIBILITY

The plot drainage will remain private and will therefore be maintained by the individual property / site owners.

It is anticipated that the detention basin, all access road and associated below ground drainage will remain private and be maintained by a third-party management company established by the site owners.

An '*Operations & Maintenance Plan*' has been made available (Report Ref K40828.O&M.002) to the site owners detailing the requirements for future maintenance of the drainage system.

# 4. FOUL WATER DRAINAGE STRATEGY

It is proposed that foul water from the new development shall be drained via gravity within the site before being discharged to the existing 225-mm combined public sewer located to the east of the site crossing Arlecdon Parks Road.

Connection is therefore proposed in this location and to facilitate disposal to the existing sewer new conveyance pipework will be required to be installed in Arlecdon Parks Road to convey flows from the site to the new connection point approximately 40m downhill.

This is achievable by conventional gravity drainage based on the existing sloping topography of the site and adjacent road.

Where a new connection is required, under Section 106 of The Water Industry Act 1991, 'the owner / occupier of any premises shall be entitled to have his drain or sewer communicate with the public sewer of any sewerage undertaker and thereby to discharge foul water and surface water from those premises or that private sewer'. Unless 'the making of the communication would be prejudicial to the undertaker's sewerage system'.

Preliminary foul water discharge calculations have been undertaken in accordance with the Design and Construction Guidance for Foul and Surface Water Sewers [16], see Table 4.1.

***Table 4.1 Peak Foul Flow Rates***

| Sewage Sector Design and Construction Guidance Clause B3.1 | |
|---|---|
| Peak Load based on number of dwellings 7 units @ 4000 (l/day) | 280,000 |
| Total Foul Flow Rate from Sites (l/s) | 0.32 |

The estimated combined peak flow from the development is 0.32 litres/second.

For further detail, refer to Drainage Layout Plan included in Appendix A.

## 5. CONCLUSIONS AND RECOMMENDATIONS

In consideration of the proposed Drainage Strategy for the site the following conclusions and recommendations are made:

- Previous ground investigations have shown that the underlying ground conditions across the site have variable levels of permeability and high groundwater and are not deemed suitable for an infiltration-based SuDS solution for a development of this scale.
- The existing sloping topography is more suited to an interception and attenuation-based surface water drainage strategy.
- It is proposed that surface water drainage shall be positively drained and attenuated, utilising a detention basin, with a flow control device restricting discharge to the pre-development greenfield QBAR rate of 2.4 l/s.
- Surface water is proposed to discharge to the existing surface water drain located east of the site in Arlecdon Parks Road with ultimate disposal to the nearby open drainage ditch via an existing stone culvert.
- Approximately 40 m of new conventional gravity pipework will be required to be installed under Arlecdon Parks Road to convey surface water and facilitate a connection to the existing manhole in this location.
- Adequate treatment of surface water runoff generated by the development will be provided by the detention basin.
- Foul flows from the site will ultimately discharge via. a new connection to the existing 225-mm diameter public combined sewer crossing under Arlecdon Parks Road approximately 35 m east of the site boundary.
- Approximately 40 m of new conventional gravity pipework will be required to be installed under Arlecdon Parks Road to convey the foul flows from the development site and facilitate a connection to the existing sewer in this location.
- Perimeter bunds and filter drains are to be installed to mitigate against surface water run-off and land drainage is proposed to be installed underneath the proposed basin to direct water away from the area and to prevent groundwater issues affecting the site drainage.
- In addition to these measures, a SuDS Operations and Maintenance Plan has been made available detailing future maintenance requirements of all sustainable drainage systems proposed at the site.

# 6. REFERENCES


[1] Ministry of Housing, Communities and Local Government, National Planning Policy Framework, July 2018.

[2] Ministry of Housing, Communities and Local Government, Planning Practice Guidance to the National Planning Policy Framework, October 2020

[3] Defra/Environment Agency, The Town and Country Planning Order 2015, 2015 No.595, April 2015.

[4] British Geological Survey, 2020. Geoindex. http://mapapps2.bgs.ac.uk/geoindex/home.html

[5] Land Information System (LANDIS)- Soilscapes viewer. http://www.landis.org.uk/soilscapes

[6] Defra Magic Maps, 2023. https://magic.defra.gov.uk/MagicMap.aspx.

[7] CIRIA, The SuDS Manual, Report C753, 2015.

[8] BS8582:2013, Code of Practice for Surface Water Management, November 2013.

[9] DEFRA/EA, Rainfall Runoff Management for Developments, SC030219, October 2013.

[10] CIRIA, Designing for Exceedance in Urban Drainage – Good Practice, Report C635, London, 2006.

[11] Centre for Ecology and Hydrology, Flood Estimation Handbook, Vols. 1 – 5 & FEH CD-ROM 3, 2009.

[12] Institute of Hydrology, Flood Studies Report, Volume 1, Hydrological Studies, 1993.

[13] Institute of Hydrology, Flood Studies Supplementary Report No 14 – Review of Regional Growth Curves, August 1983.

[14] Marshall & Bayliss, 1994. Flood Estimation for Small Catchments, Report No. 124 (IoH 124), Institute of Hydrology.

[15] Department for Environment, Food and Rural Affairs, Non-Statutory Technical Standards for Sustainable Drainage Systems, March 2015

[16] Water UK, Design and Construction Guidance for Foul & Surface Water Sewers Offered for Adoption Under the Code for Adoption Agreements for Water and Sewage Companies Operating Wholly or Mainly in England, Approved Version 2.0 10 March 2020

# APPENDIX A

SITE PLAN & DRAINAGE LAYOUT

HAZARD
RISK
ACTION

| | |
|---|---|
| HAZARD: | Numerous utilities are known to be present in existing road. Utilities shown are indicative only based on records available. |
| RISK: | Risk of utilities strike and new pipework clashing at crossover points. |
| ACTION: | Trial holes to be dug and location and depth of various utilities to be confirmed prior to construction. Drainage levels and location subject to change pending investigations. |

N

General

1. This drawing should not be scaled - use figured dimensions only. If in doubt, ask.
2. All dimensions are in millimetres unless stated otherwise.
3. This drawing is to be read in conjunction with all relevant Architects drawings as well as all other drawings by RG Parkins (refer to RG Parkins drawing register).
4. The Contractor is responsible for verifying all dimensions on site prior to commencing works.
5. Any specified proprietary products are to be installed in strict accordance with manufacturers guidelines. No specified product should be substituted without gaining approval from RG Parkins.

New gully at site entrance to mitigate against existing surface runoff from highway entering the site. To be connected to existing highways drainage in road.

Plot Drainage by others. Indicative drag out locations shown for refernce

GFL 98.15

GFL 97.00

GFL 96.50

GFL 97.15

GFL 96.40

GFL 96.00

GFL 95.65

SW01 600Ø PPIC CL ~97.58 IL ~96.16

FW01 600Ø PPIC CL ~97.40 IL ~96.05

SW05 600Ø PPIC CL ~96.75 IL ~94.25

SW04 600Ø PPIC CL ~96.75 IL ~94.30

SW02 600Ø PPIC CL ~96.40 IL ~94.98

FW02 600Ø PPIC CL ~96.40 IL ~95.05

SW03 600Ø PPIC CL ~96.00 IL ~94.58

FW03 600Ø PPIC CL ~96.30 IL ~94.95

SW03 600Ø PPIC CL ~95.25 IL ~94.36

FW04 450Ø PPIC CL ~95.20 IL ~94.80

FW05 450Ø PPIC CL ~96.50 IL ~94.71

FW06 450Ø PPIC CL ~96.20 IL ~94.65

SW06 Silt Trap 600Ø PPIC CL ~94.80 IL ~93.50

Linear channel drain at driveway entrances

Perforated land drain below basin liner

Localised stone pitching at downstream face of inlet headwall to prevent erosion

Basin Forebay Area

250mm high permeable gabion bund to forebay

Low flow swale

Althon H3C (Outlet headwall) IL ~92.75

SW07 Flow Control Chamber Design Flow = 2.4 l/s CL ~94.35 IL ~92.70

FW09 12000Ø PCC MH CL ~94.10 IL ~92.20 *Levels TBC **Subject to CC Highways approval

SW09 PCC 1200 x 750mm rectangular chamber to suit utility space constraints. CL ~93.90 IL ~92.40 *Levels TBC **Subject to CC Highways approval

FW10 1050Ø PCC MH CL ~91.60 IL ~90.20 *Levels TBC **Subject to CC Highways approval

150Ø Saddle connection to existing pipe IL ~90.00 *Levels TBC **Subject to UU approval

150Ø Connection to Existing SW MH CL ~91.39 IL ~89.80 *Levels tbc **Subject to CC Highways approval

SW08 Silt Trap 600Ø PPIC CL ~93.25 IL ~92.50

FW08 450Ø PPIC CL ~93.00 IL ~92.30

1m wide x 300mm earth bund and adjacent filter drain along perimeter boundary to mitigate SW runoff from site

Crest level lowered by 50mm to create Exceedence Spillway

Existing highways gullies to be connected to new SW pipe in this vicinity if required

Existing SW stone culvert Alignment and levels TBC

Silt Trap 600Ø PPIC CL ~93.25 IL ~92.55

FW07 450Ø PPIC CL ~94.00 IL ~93.40

1m wide x 300mm high earth bund and adjacent filter drain along perimeter boundary to mitigate SW runoff from site

1m wide crest to basin

Althon H3C (Inlet headwall) IL ~93.36 C/W Localised stone pitching at the downstream face of the headwall to prevent erosion

Detention Basin

| | |
|---|---|
| Basin crest level | = ~94.35m |
| Bed of basin level | = ~92.75m |
| Catchment area | = 0.229ha |
| Side slope | = 1 in 2.5 |
| Total Storage Volume | = 265m³ |

Dashed line indicates approx. extent of basin liner (impermeable geomembrane) to be anchored in trench in basin crest

Existing 225Ø UU Combined Sewer

Existing UU Combined Sewer Overflow

Existing Open Drainage Ditch

Ground profile graded to create surface channel to divert exceedence flows from highway towards perimeter land drain

Temporary filter drain to mitigate runoff during construction phase. Construct at outset along with perimeter bund and filter drain.

## Drainage Key

- Highways Drainage
- Existing Combined Water Public Sewer
- Existing Combined Water Public Sewer Overflow
- Existing Surface Water Public Sewer
- Foul Water Private Drainage
- Surface Water Private Drainage
- Land Drainage
- Temporary Land Drainage
- Linear Channel Drain
- Basin Land Drainage
- Exceedance Flow

| Rev | Description | Date | Revised by | Checked by | Approved |
|---|---|---|---|---|---|

Issue Purpose: PLANNING

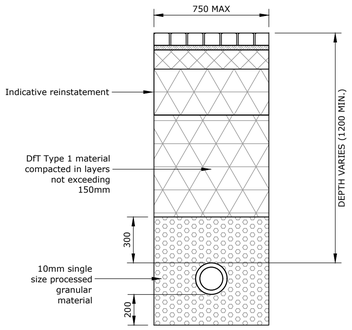
Do not scale from this drawing

R G PARKINS

Kendal | 01539 729393 Lancaster | 01524 32548

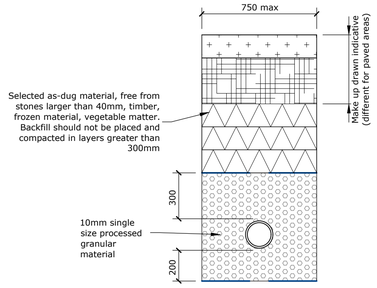
| | | | |
|---|---|---|---|
| Client: | Stewart Richardson | | |
| Project: | Arlecdon Parks Road | | |
| Drawing Title: | Proposed Foul and Surface Water Drainage | | |

| | | |
|---|---|---|
| Scale @ A1: 1:200 | First Issue: 20/12/2023 | Office of Origin: Kendal |
| Drawn by: CA | Checked by: OS | Approved: OS |
| Project No: K40828 | Drawing No: 01 | Rev: |
| BIM No: | | |



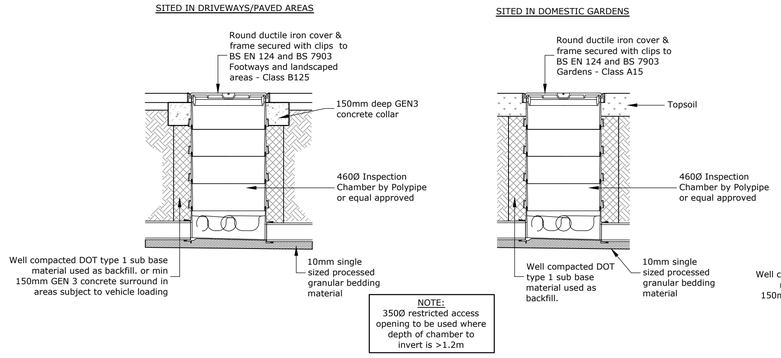

## TYPE 7 EMBEDMENT CLASS S FOR 150Ø PIPES IN HARD LANDSCAPED AREAS

SCALE 1:20



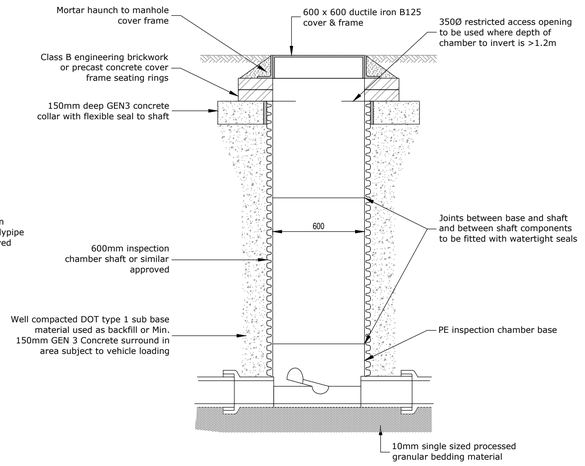

## TYPE 7 EMBEDMENT CLASS S FOR 150Ø PIPES IN SOFT LANDSCAPED AREAS [225Ø similar]

SCALE 1:20




## TYPICAL INSPECTION CHAMBER DETAIL

Scale 1:20

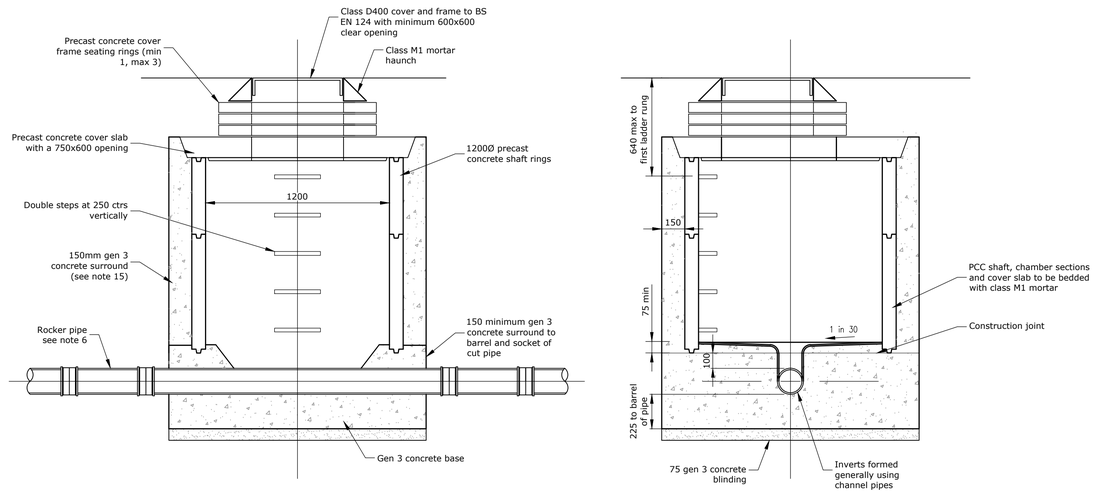



## LARGE ACCESS CHAMBER DETAIL (LIC)

SCALE 1:20

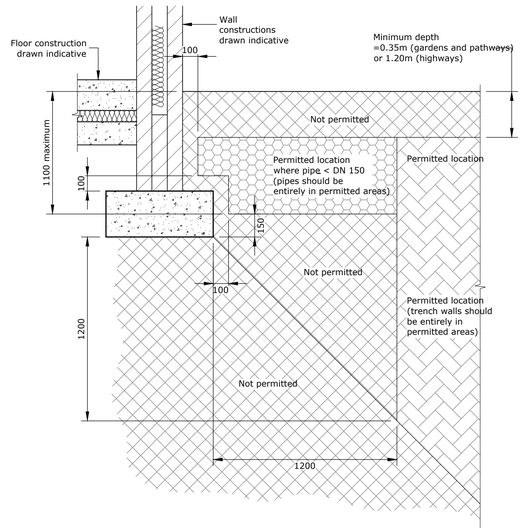
General

1. This drawing should not be scaled - use figured dimensions only. If in doubt, ask.
2. All dimensions are in millimetres unless stated otherwise.
3. This drawing is to be read in conjunction with all relevant Architects drawings as well as all other drawings by RG Parkins (refer to RG Parkins drawing register).
4. The Contractor is responsible for verifying all dimensions on site prior to commencing works.
5. Any specified proprietary products are to be installed in strict accordance with manufacturers guidelines. No specified product should be substituted without gaining approval from RG Parkins.



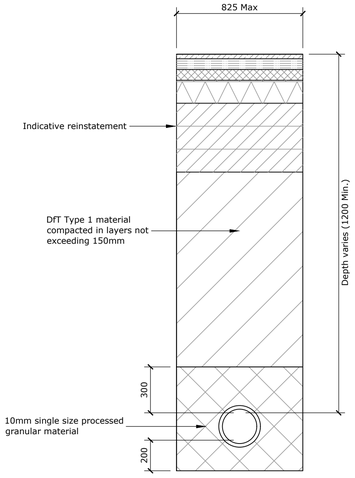

## TYPICAL SECTION THROUGH 1200Ø MANHOLES > 1.5m TO SOFFIT

SCALE 1:20



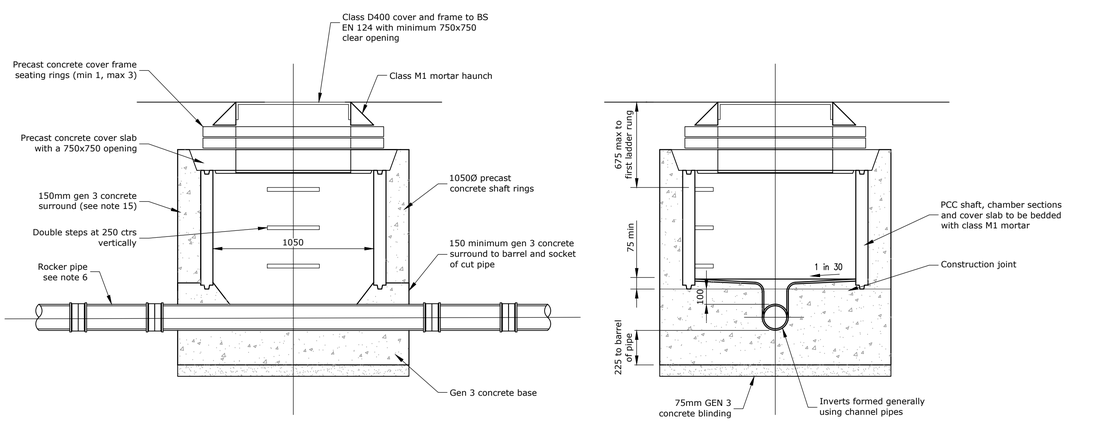

## PERMITTED LOCATION OF SEWERS AND LATERAL DRAINS IN PROXIMITY TO BUILDINGS

SCALE 1:20



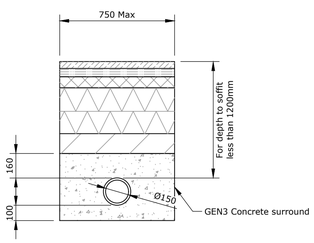

## TYPE 7 EMBEDMENT CLASS S FOR 225Ø PIPE

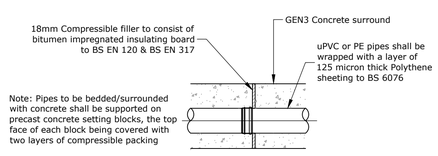
SCALE 1:20




## TYPICAL SECTION THROUGH 1050Ø MANHOLES < 1.5m TO SOFFIT

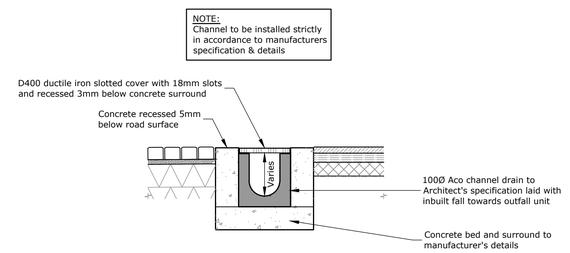
SCALE 1:20




## CONCRETE SURROUND FOR 150Ø Upvc PIPE [IF REQUIRED]

SCALE 1:20




## TYPICAL CHANNEL DRAIN DETAIL

SCALE 1:20

| Rev | Description | Date | Revised by | Checked by | Approved |
|---|---|---|---|---|---|

Issue Purpose: PLANNING

Do not scale from this drawing

R G PARKINS

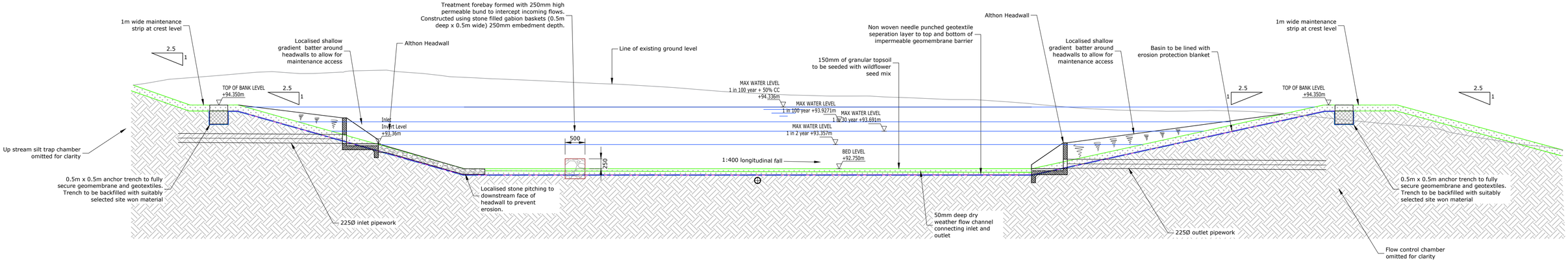
Kendal | 01539 729393 Lancaster | 01524 32548

| | | | |
|---|---|---|---|
| Scale @ A1: 1:20 | First Issue: 20/12/2023 | Office of Origin: Kendal | |
| Drawn by: CA | Checked by: OS | Approved: OS | |
| Client: Stewart Richardson | | | |
| Project No: K40828 | Drawing No: 02 | Rev: | |
| Project: Arlecdon Parks Road | | | |
| Drawing Title: Typical Drainage Construction Details Sheet 1 of 2 | BIM No: | | |

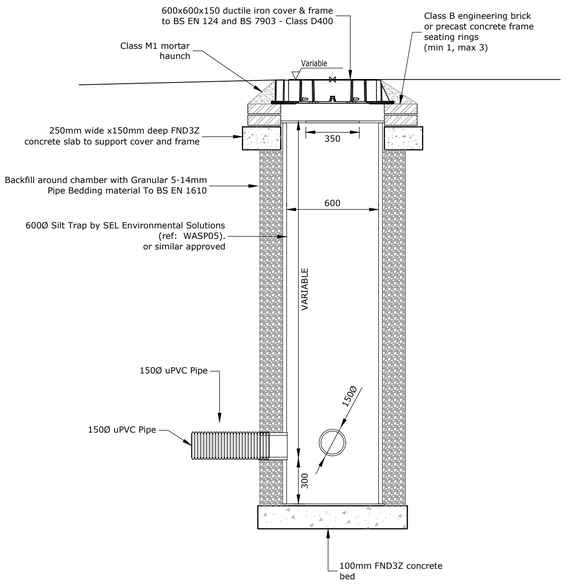
General

1. This drawing should not be scaled - use figured dimensions only. If in doubt, ask.
2. All dimensions are in millimetres unless stated otherwise.
3. This drawing is to be read in conjunction with all relevant Architects drawings as well as all other drawings by RG Parkins (refer to RG Parkins drawing register).
4. The Contractor is responsible for verifying all dimensions on site prior to commencing works.
5. Any specified proprietary products are to be installed in strict accordance with manufacturers guidelines. No specified product should be substituted without gaining approval from RG Parkins.

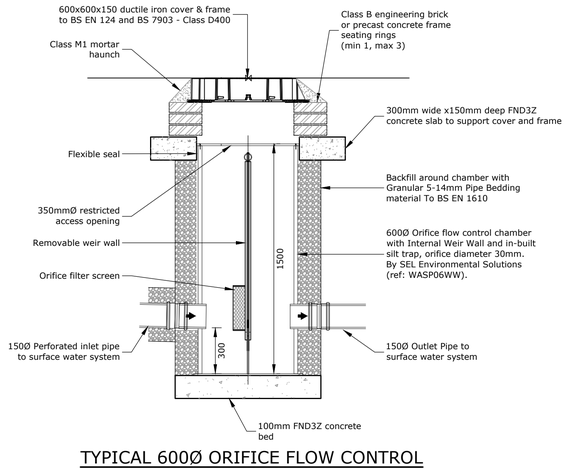
Detention Basin to be lined with:
1. TECHMAT CB350 Erosion Control Mat
2. TNW 1100 Separation Geotextile
3. TECHLINE 2000 Impermeable Geomembrane
4. TNW 1100 Separation Geotextile



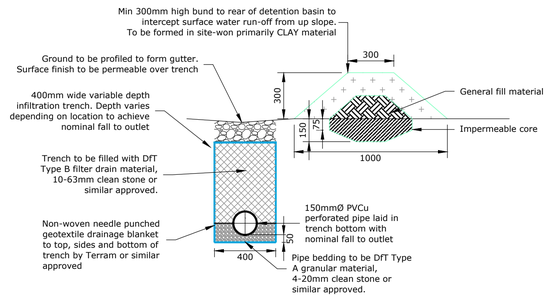

## TYPICAL SECTION A-A THROUGH DETENTION BASIN
SCALE 1:50




## TYPICAL 600Ø SILT TRAP [450Ø SIMILAR]
scale 1:20




## TYPICAL 600Ø ORIFICE FLOW CONTROL UNIT WITH INTERNAL WEIR WALL
Scale 1:20




## TYPICAL SECTION THROUGH PERIMETER BUND
SCALE 1:20

| Rev | Description | Date | Revised by | Checked by | Approved |
|---|---|---|---|---|---|

Issue Purpose: PLANNING

Do not scale from this drawing

R G PARKINS
Kendal | 01539 729393 Lancaster | 01524 32548

| | | | | | |
|---|---|---|---|---|---|
| Client: | Stewart Richardson | | | | |
| Project: | Arlecdon Parks Road | | | | |
| Drawing Title: | Typical Drainage Construction Details Sheet 2 of 2 | | | | |

| Scale @ A1: | First Issue: | Office of Origin: |
|---|---|---|
| As shown | 20/12/2023 | Kendal |
| Drawn by: CA | Checked by: OS | Approved: OS |
| Project No: K40828 | Drawing No: 03 | Rev: |
| BIM No: | | |

# APPENDIX B

CALCULATIONS:

PRE-DEVELOPMENT RUNOFF RATES

CAUSEWAY FLOW

SURFACE WATER QUALITY

R G PARKINS
97 King Street | Lancaster | LA1 1RH
Tel:01524 32548
Email: office@rgparkinslancaster.co.uk

| Wallingford Runoff Estimation | Job Number K40828 | Page Number 1 of 4 |
|---|---|---|
| | Calc by CA | Check by OS |
| Park Road Arlecdon | Date 24/11/2023 | Revised XX |

## DESIGN BASIS MEMORANDUM - PEAK RATE OF RUN-OFF CALCULATION

### Design Brief

The following peak rate of run-off calculations have been undertaken to determine changes in peak flow resulting from the development of a greenfield or brownfield site. These calculations are for the **Peak Rate of Run-Off** requirements only.

### Background Information & References

The site area **is less than** 200ha and the Greenfield (pre-development) calculation has been undertaken in accordance with methodology described by Marshall & Bayliss, Institute of Hydrology, Report No. 124, Flood Estimation for Small Catchments, 1994 (IoH 124).

In addition, the following references have been used in the preparation of these calculations:

- Interim Code of Practice for Sustainable Drainage Systems (SUDS), CIRIA, 2004
- CIRIA, The SUDS Manual, Report C753, 2015
- Designing for Exceedance in Urban Drainage - good practice, CIRIA Report C635, 2006
- Flood Estimation Handbook (FEH)
- Flood Studies Report (FSR), Volume 1, Hydrological Studies, 1993
- Flood Studies Supplementary Report No 2 (FSSR2), The Estimation of Low Return Period Floods
- Flood Studies Supplementary Report No 14 (FSSR14), Review of Regional Growth Curves, 1983
- Planning Practice guidance of the National Planning Policy Framework, Recommended national precautionary sensitivity ranges for peak rainfall intensities, peak river flows, offshore wind speeds and wave heights.

### Proposed Land Use Changes

Changes to the existing site are as follows:

Greenfield Site to Brownfield Site

### Results Summary

| Rate of Run-Off (l/s) | | [redacted] |
|---|---|---|
| **Event** | **Greenfield** | |
| Q1 | 2.1 | |
| QBAR | 2.4 | |
| Q10 | 3.3 | |
| Q30 | 4.1 | |
| Q100 | 5.0 | |
| Q100 + 50% CC | 7.5 | |

R G PARKINS
97 King Street | Lancaster | LA1 1RH
Tel:01524 32548
Email: office@rgparkinslancaster.co.uk

| Wallingford Runoff Estimation | Job Number K40828 | Page Number 2 of 4 |
|---|---|---|
| | Calc by CA | Check by OS |
| Park Road Arlecdon | Date 24/11/2023 | Revised XX |

## SITE AREAS (LAND COVER AREAS)

### Existing Impermeable & Permeable Land Cover

Total Site Area: **0.3525** ha **3525** m²

### Existing Impermeable & Permeable Land Cover

| Land Cover | Area | | Percentage of total site area |
|---|---|---|---|
| | m² | ha | |
| Total impermeable area | 0.0 | 0.000 | 0% |
| Remaining permeable area | 3525.0 | 0.353 | 100% |

### Proposed Land Cover Areas

| Land Cover | Area | | Percentage of total site area |
|---|---|---|---|
| | m² | ha | |
| Total housing roof area | 730.9 | 0.073 | 21% |
| Total parking and paved area | 804.0 | 0.080 | 23% |
| Total road area | 470.0 | 0.047 | 13% |
| Detention basin area | 277.6 | 0.028 | 8% |
| Garden & landscaped areas | 1242.5 | 0.124 | 35% |

### Proposed Impermeable & Permeable Land Cover

| Land Cover | Area | | Percentage of total site area |
|---|---|---|---|
| | m² | ha | |
| Total impermeable area | 2282.5 | 0.228 | 65% |
| Remaining permeable area | 1242.5 | 0.124 | 35% |

R G PARKINS
97 King Street | Lancaster | LA1 1RH
Tel:01524 32548
Email: office@rgparkinslancaster.co.uk

| Wallingford Runoff Estimation | Job Number K40828 | Page Number 3 of 4 |
|---|---|---|
| | Calc by CA | Check by OS |
| Park Road Arlecdon | Date 24/11/2023 | Revised XX |

## ESTIMATION OF QBAR (RURAL) (GREENFIELD RUNOFF RATE)

IoH 124 based on research on small catchments < 25 km2

Method is based on regression analysis of response times
using catchments from 0.9 to 22.9 $km^2$

$QBAR_{rural}$ is mean annual flood on rural catchment
$QBAR_{rural}$ depends on SOIL, SAAR and AREA most significantly

$QBAR_{rural} = 0.00108 \times AREA^{0.89} \times SAAR^{1.17} \times SOIL^{2.17}$

For SOIL refer to FSR Vol 1, Section 4.2.3 and 4.2.6 and IoH 124

Contributing watershed area

| | | | | |
|---|---|---|---|---|
| Area, A | = | 500000 | $m^2$ | insert 50 ha for EA |
| | = | 0.500 | $km^2$ | small catchment method |
| | = | 50.000 | ha | |

SAAR = **1360** mm — From FEH Web Service (point data)

Soil index based on soil type, SOIL

$$= \frac{(0.1S1+0.3S2+0.37S3+0.47S4+0.53S5)}{(S1+S2+S3+S4+S5)}$$

| Where: | | | |
|---|---|---|---|
| S1 | = | | % |
| S2 | = | | % |
| S3 | = | | % |
| S4 | = | **100** | % |
| S5 | = | | % |
| | | 100 | % |

UK Suds website provides a value of 4 based on the equivalent Host value. This seems reasonable based on ground investigation.

So, SOIL = **0.47**

Note: for very small catchments it is far better to rely on local site investigation information.

| | | | |
|---|---|---|---|
| $QBAR_{rural}$ | = | 0.525 | $m^3/s$ |
| | = | 525.0 | l/s |

**Small rural catchments less than 50 ha**
The Environment Agency recommends that this method should be used for development sizes from 0 to 50 ha and should linearly interpolate the formula to 50 ha.

| | | | | |
|---|---|---|---|---|
| So, catchment size | = | **2282** | $m^2$ | Excluding significant open space which would remain disconnected from the positive drainage system during flood events. |
| | = | 0.002 | $km^2$ | |
| | = | 0.228 | ha | |
| $QBAR_{rural\ site}$ | = | 0.00240 | $m^3/s$ | |
| | = | **2.40** | l/s | |

R G PARKINS
97 King Street | Lancaster | LA1 1RH
Tel:01524 32548
Email: office@rgparkinslancaster.co.uk

| Wallingford Runoff Estimation | Job Number K40828 | Page Number 4 of 4 |
|---|---|---|
| | Calc by CA | Check by OS |
| Park Road Arlecdon | Date 24/11/2023 | Revised XX |

## GREENFIELD RETURN PERIOD ORDINATES

QBAR can be factored by the UK FSR regional growth curves for return periods <2 years and for all other return periods to obtain peak flow estimates for required return periods.

These regional growth curves are constant throughout a region, whatever the catchment type and size.

See Table 2.39 for region curve ordinates
Use FSSR2 Growth Curves to estimate Qbar

Reference- Pg 173-FSR V.1, ch 2.6.2

Region = **10**

Use Figure A1.1 to determine region

## GREENFIELD RETURN PERIOD FLOW RATES

| Return Period | Ordinate | Q (l/s) |
|---|---|---|
| 1 | 0.87 | 2.09 |
| 2 | 0.93 | 2.23 |
| 5 | 1.19 | 2.85 |
| 10 | 1.38 | 3.31 |
| 25 | 1.64 | 3.93 |
| 30 | 1.7 | 4.07 |
| 50 | 1.85 | 4.43 |
| 100 | 2.08 | 4.99 |
| 200 | 2.32 | 5.56 |
| 500 | 2.73 | 6.54 |
| 1000 | 3.04 | 7.29 |

Ordinate from FSSR2

Interpolation taken from Figure 24.2 (pg 515) SuDS Manual

## Design Settings

| | | | |
|---|---|---|---|
| Rainfall Methodology | FEH-22 | Minimum Velocity (m/s) | 1.00 |
| Return Period (years) | 100 | Connection Type | Level Soffits |
| Additional Flow (%) | 50 | Minimum Backdrop Height (m) | 0.200 |
| CV | 1.000 | Preferred Cover Depth (m) | 1.200 |
| Time of Entry (mins) | 4.00 | Include Intermediate Ground | x |
| Maximum Time of Concentration (mins) | 30.00 | Enforce best practice design rules | ✓ |
| Maximum Rainfall (mm/hr) | 50.0 | | |

## Nodes

| Name | Area (ha) | T of E (mins) | Cover Level (m) | Diameter (mm) | Easting (m) | Northing (m) | Depth (m) |
|---|---|---|---|---|---|---|---|
| 1 | 0.033 | 4.00 | 97.580 | 600 | 305030.687 | 518666.002 | 1.420 |
| 2 | 0.033 | 4.00 | 96.400 | 600 | 305022.715 | 518653.310 | 1.420 |
| 3 | 0.060 | 4.00 | 96.000 | 600 | 305021.827 | 518646.413 | 1.420 |
| 4 | 0.028 | 4.00 | 95.400 | 600 | 305039.840 | 518642.563 | 1.040 |
| 5 | 0.021 | 4.00 | 96.750 | 600 | 305042.242 | 518653.878 | 2.450 |
| 6 | | | 96.750 | 600 | 305045.271 | 518656.744 | 2.500 |
| 7 ST | 0.026 | 4.00 | 94.800 | 600 | 305065.176 | 518655.020 | 1.300 |
| Inlet | 0.028 | | 94.350 | | 305068.047 | 518655.503 | 1.563 |
| Outlet | | 4.00 | 94.350 | | 305093.329 | 518666.899 | 1.600 |
| 8 FC | | | 94.350 | 600 | 305094.149 | 518667.161 | 1.650 |
| 10 | | | 93.500 | 600 | 305101.121 | 518668.768 | 1.100 |
| 11 | | | 93.500 | 1050 | 305106.502 | 518673.556 | 1.400 |

## Links

| Name | US Node | DS Node | Length (m) | ks (mm) / n | US IL (m) | DS IL (m) | Fall (m) | Slope (1:X) | Dia (mm) | T of C (mins) | Rain (mm/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.000 | 1 | 2 | 14.988 | 0.600 | 96.160 | 94.980 | 1.180 | 12.7 | 225 | 4.07 | 50.0 |
| 1.001 | 2 | 3 | 6.954 | 0.600 | 94.980 | 94.580 | 0.400 | 17.4 | 225 | 4.10 | 50.0 |
| 1.002 | 3 | 4 | 18.420 | 0.600 | 94.580 | 94.360 | 0.220 | 83.7 | 225 | 4.32 | 50.0 |
| 1.003 | 4 | 5 | 11.567 | 0.600 | 94.360 | 94.300 | 0.060 | 192.8 | 225 | 4.52 | 50.0 |
| 1.004 | 5 | 6 | 4.170 | 0.600 | 94.300 | 94.250 | 0.050 | 83.4 | 225 | 4.57 | 50.0 |
| 1.005 | 6 | 7 ST | 19.980 | 0.600 | 94.250 | 93.500 | 0.750 | 26.6 | 225 | 4.70 | 50.0 |
| 1.006 | 7 ST | Inlet | 2.911 | 0.600 | 93.500 | 93.360 | 0.140 | 20.8 | 225 | 4.72 | 50.0 |
| 1.007 | Outlet | 8 FC | 1.000 | 0.600 | 92.750 | 92.700 | 0.050 | 20.0 | 225 | 4.01 | 50.0 |
| 1.008 | 8 FC | 10 | 7.155 | 0.600 | 92.700 | 92.400 | 0.300 | 23.8 | 150 | 4.06 | 50.0 |
| 1.009 | 10 | 11 | 7.203 | 0.600 | 92.400 | 92.100 | 0.300 | 24.0 | 150 | 4.12 | 50.0 |

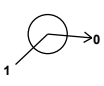
| Name | Vel (m/s) | Cap (l/s) | Flow (l/s) | US Depth (m) | DS Depth (m) | Σ Area (ha) | Σ Add Inflow (l/s) |
|---|---|---|---|---|---|---|---|
| 1.000 | 3.691 | 146.8 | 8.9 | 1.195 | 1.195 | 0.033 | 0.0 |
| 1.001 | 3.153 | 125.4 | 17.9 | 1.195 | 1.195 | 0.066 | 0.0 |
| 1.002 | 1.430 | 56.8 | 34.2 | 1.195 | 0.815 | 0.126 | 0.0 |
| 1.003 | 0.938 | 37.3 | 41.7 | 0.815 | 2.225 | 0.154 | 0.0 |
| 1.004 | 1.433 | 57.0 | 47.4 | 2.225 | 2.275 | 0.175 | 0.0 |
| 1.005 | 2.545 | 101.2 | 47.4 | 2.275 | 1.075 | 0.175 | 0.0 |
| 1.006 | 2.882 | 114.6 | 54.5 | 1.075 | 0.765 | 0.201 | 0.0 |
| 1.007 | 2.939 | 116.8 | 0.0 | 1.375 | 1.425 | 0.000 | 0.0 |
| 1.008 | 2.070 | 36.6 | 0.0 | 1.500 | 0.950 | 0.000 | 0.0 |
| 1.009 | 2.063 | 36.5 | 0.0 | 0.950 | 1.250 | 0.000 | 0.0 |

## Pipeline Schedule

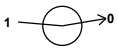
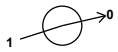
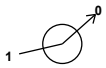
| Link | Length (m) | Slope (1:X) | Dia (mm) | Link Type | US CL (m) | US IL (m) | US Depth (m) | DS CL (m) | DS IL (m) | DS Depth (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.000 | 14.988 | 12.7 | 225 | Circular | 97.580 | 96.160 | 1.195 | 96.400 | 94.980 | 1.195 |
| 1.001 | 6.954 | 17.4 | 225 | Circular | 96.400 | 94.980 | 1.195 | 96.000 | 94.580 | 1.195 |
| 1.002 | 18.420 | 83.7 | 225 | Circular | 96.000 | 94.580 | 1.195 | 95.400 | 94.360 | 0.815 |
| 1.003 | 11.567 | 192.8 | 225 | Circular | 95.400 | 94.360 | 0.815 | 96.750 | 94.300 | 2.225 |
| 1.004 | 4.170 | 83.4 | 225 | Circular | 96.750 | 94.300 | 2.225 | 96.750 | 94.250 | 2.275 |
| 1.005 | 19.980 | 26.6 | 225 | Circular | 96.750 | 94.250 | 2.275 | 94.800 | 93.500 | 1.075 |
| 1.006 | 2.911 | 20.8 | 225 | Circular | 94.800 | 93.500 | 1.075 | 94.350 | 93.360 | 0.765 |
| 1.007 | 1.000 | 20.0 | 225 | Circular | 94.350 | 92.750 | 1.375 | 94.350 | 92.700 | 1.425 |
| 1.008 | 7.155 | 23.8 | 150 | Circular | 94.350 | 92.700 | 1.500 | 93.500 | 92.400 | 0.950 |
| 1.009 | 7.203 | 24.0 | 150 | Circular | 93.500 | 92.400 | 0.950 | 93.500 | 92.100 | 1.250 |

| Link | US Node | Dia (mm) | Node Type | MH Type | DS Node | Dia (mm) | Node Type | MH Type |
|---|---|---|---|---|---|---|---|---|
| 1.000 | 1 | 600 | Manhole | Adoptable | 2 | 600 | Manhole | Adoptable |
| 1.001 | 2 | 600 | Manhole | Adoptable | 3 | 600 | Manhole | Adoptable |
| 1.002 | 3 | 600 | Manhole | Adoptable | 4 | 600 | Manhole | Adoptable |
| 1.003 | 4 | 600 | Manhole | Adoptable | 5 | 600 | Manhole | Adoptable |
| 1.004 | 5 | 600 | Manhole | Adoptable | 6 | 600 | Manhole | Adoptable |
| 1.005 | 6 | 600 | Manhole | Adoptable | 7 ST | 600 | Manhole | Adoptable |
| 1.006 | 7 ST | 600 | Manhole | Adoptable | Inlet | | Manhole | Adoptable |
| 1.007 | Outlet | | Junction | | 8 FC | 600 | Manhole | Adoptable |
| 1.008 | 8 FC | 600 | Manhole | Adoptable | 10 | 600 | Manhole | Adoptable |
| 1.009 | 10 | 600 | Manhole | Adoptable | 11 | 1050 | Manhole | Adoptable |

## Manhole Schedule

| Node | Easting (m) | Northing (m) | CL (m) | Depth (m) | Dia (mm) | Connections | | Link | IL (m) | Dia (mm) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 305030.687 | 518666.002 | 97.580 | 1.420 | 600 |  | 0 | 1.000 | 96.160 | 225 |
| 2 | 305022.715 | 518653.310 | 96.400 | 1.420 | 600 |  | 1 | 1.000 | 94.980 | 225 |
| | | | | | | | 0 | 1.001 | 94.980 | 225 |
| 3 | 305021.827 | 518646.413 | 96.000 | 1.420 | 600 |  | 1 | 1.001 | 94.580 | 225 |
| | | | | | | | 0 | 1.002 | 94.580 | 225 |
| 4 | 305039.840 | 518642.563 | 95.400 | 1.040 | 600 |  | 1 | 1.002 | 94.360 | 225 |
| | | | | | | | 0 | 1.003 | 94.360 | 225 |
| 5 | 305042.242 | 518653.878 | 96.750 | 2.450 | 600 |  | 1 | 1.003 | 94.300 | 225 |
| | | | | | | | 0 | 1.004 | 94.300 | 225 |
| 6 | 305045.271 | 518656.744 | 96.750 | 2.500 | 600 |  | 1 | 1.004 | 94.250 | 225 |
| | | | | | | | 0 | 1.005 | 94.250 | 225 |

## Manhole Schedule

| Node | Easting (m) | Northing (m) | CL (m) | Depth (m) | Dia (mm) | Connections | Link | IL (m) | Dia (mm) |
|---|---|---|---|---|---|---|---|---|---|
| 7 ST | 305065.176 | 518655.020 | 94.800 | 1.300 | 600 | 1 | 1.005 | 93.500 | 225 |
| | | | | | |  | | | |
| | | | | | | 0 | 1.006 | 93.500 | 225 |
| Inlet | 305068.047 | 518655.503 | 94.350 | 1.563 | | 1 | 1.006 | 93.360 | 225 |
| | | | | | |  | | | |
| Outlet | 305093.329 | 518666.899 | 94.350 | 1.600 | | | | | |
| | | | | | |  | | | |
| | | | | | | 0 | 1.007 | 92.750 | 225 |
| 8 FC | 305094.149 | 518667.161 | 94.350 | 1.650 | 600 | 1 | 1.007 | 92.700 | 225 |
| | | | | | |  | | | |
| | | | | | | 0 | 1.008 | 92.700 | 150 |
| 10 | 305101.121 | 518668.768 | 93.500 | 1.100 | 600 | 1 | 1.008 | 92.400 | 150 |
| | | | | | |  | | | |
| | | | | | | 0 | 1.009 | 92.400 | 150 |
| 11 | 305106.502 | 518673.556 | 93.500 | 1.400 | 1050 | 1 | 1.009 | 92.100 | 150 |
| | | | | | |  | | | |

## Simulation Settings

| | | | | | |
|---|---|---|---|---|---|
| Rainfall Methodology | FEH-22 | Skip Steady State | x | Check Discharge Volume | ✓ |
| Summer CV | 0.750 | Drain Down Time (mins) | 240 | 100 year 360 minute (m³) | |
| Winter CV | 1.000 | Additional Storage (m³/ha) | 20.0 | | |
| Analysis Speed | Normal | Check Discharge Rate(s) | x | | |

### Storm Durations

| 15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440 |
|---|---|---|---|---|---|---|---|---|---|---|---|

| Return Period (years) | Climate Change (CC %) | Additional Area (A %) | Additional Flow (Q %) |
|---|---|---|---|
| 100 | 50 | 0 | 0 |

## Pre-development Discharge Volume

| | | | |
|---|---|---|---|
| Site Makeup | Greenfield | Return Period (years) | 100 |
| Greenfield Method | FSR/FEH | Climate Change (%) | 0 |
| Positively Drained Area (ha) | | Storm Duration (mins) | 360 |
| Soil Index | 1 | Betterment (%) | 0 |
| SPR | 0.10 | PR | |
| CWI | | Runoff Volume (m³) | |

## Node 8 FC Online Orifice Control

| | | | | | |
|---|---|---|---|---|---|
| Flap Valve | x | Design Depth (m) | 1.600 | Discharge Coefficient | 0.600 |
| Replaces Downstream Link | ✓ | Design Flow (l/s) | 2.4 | | |
| Invert Level (m) | 92.700 | Diameter (m) | 0.030 | | |

## Node Outlet Flow through Pond Storage Structure

| | | | | | |
|---|---|---|---|---|---|
| Base Inf Coefficient (m/hr) | 0.00000 | Porosity | 1.00 | Main Channel Length (m) | 15.000 |
| Side Inf Coefficient (m/hr) | 0.00000 | Invert Level (m) | 92.750 | Main Channel Slope (1:X) | 400.0 |
| Safety Factor | 2.0 | Time to half empty (mins) | | Main Channel n | 0.030 |

**Inlets**

Inlet

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 47.4 | 0.0 | 1.600 | 284.1 | 0.0 |

**Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 98.19%**

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status |
|---|---|---|---|---|---|---|---|---|
| 15 minute winter | 1 | 10 | 96.216 | 0.056 | 20.4 | 0.0422 | 0.0000 | OK |
| 15 minute winter | 2 | 11 | 95.777 | 0.797 | 40.8 | 0.5962 | 0.0000 | SURCHARGED |
| 15 minute winter | 3 | 11 | 95.724 | 1.144 | 71.2 | 1.2903 | 0.0000 | FLOOD RISK |
| 15 minute winter | 4 | 11 | 95.333 | 0.973 | 84.2 | 0.7988 | 0.0000 | FLOOD RISK |
| 15 minute winter | 5 | 11 | 94.928 | 0.628 | 93.4 | 0.2852 | 0.0000 | SURCHARGED |
| 15 minute winter | 6 | 11 | 94.653 | 0.403 | 92.3 | 0.1141 | 0.0000 | SURCHARGED |
| 1440 minute winter | 7 ST | 1140 | 94.337 | 0.837 | 10.3 | 0.5718 | 0.0000 | SURCHARGED |
| 1440 minute winter | Inlet | 1170 | 94.336 | 1.549 | 17.9 | 0.5545 | 0.0000 | OK |
| 1440 minute winter | Outlet | 1170 | 94.337 | 1.587 | 28.6 | 0.0000 | 0.0000 | FLOOD RISK |
| 1440 minute winter | 8 FC | 1140 | 94.337 | 1.637 | 4.5 | 0.4633 | 0.0000 | FLOOD RISK |
| 1440 minute winter | 10 | 1170 | 92.427 | 0.027 | 2.4 | 0.0076 | 0.0000 | OK |
| 1440 minute winter | 11 | 1170 | 92.126 | 0.026 | 2.4 | 0.0000 | 0.0000 | OK |

| Link Event (Upstream Depth) | US Node | Link | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|---|---|---|---|---|---|---|---|---|
| 15 minute winter | 1 | 1.000 | 2 | 20.4 | 1.628 | 0.139 | 0.3564 | |
| 15 minute winter | 2 | 1.001 | 3 | 35.1 | 1.116 | 0.280 | 0.2766 | |
| 15 minute winter | 3 | 1.002 | 4 | 66.9 | 1.682 | 1.177 | 0.7326 | |
| 15 minute winter | 4 | 1.003 | 5 | 81.5 | 2.050 | 2.186 | 0.4600 | |
| 15 minute winter | 5 | 1.004 | 6 | 92.3 | 2.321 | 1.620 | 0.1658 | |
| 15 minute winter | 6 | 1.005 | 7 ST | 91.9 | 2.311 | 0.909 | 0.7946 | |
| 1440 minute winter | 7 ST | 1.006 | Inlet | 16.7 | 1.414 | 0.145 | 0.1158 | |
| 1440 minute winter | Inlet | Flow through pond | Outlet | 28.6 | 0.024 | 0.002 | 256.4245 | |
| 1440 minute winter | Outlet | 1.007 | 8 FC | 4.5 | 0.325 | 0.038 | 0.0398 | |
| 1440 minute winter | 8 FC | Orifice | 10 | 2.4 | | | | |
| 1440 minute winter | 10 | 1.009 | 11 | 2.4 | 1.141 | 0.066 | 0.0151 | 183.1 |

## DESIGN BASIS MEMORANDUM - SUSTAINABLE DRAINAGE TREATMENT OF SURFACE WATER

### Design Brief

The following calculations outline the recommended treatment requirements for a sustaionable drainage system as outlined in the SuDS Manual 2015. The method used is the simple index approach outlined in section 26.
The requirement for oil interceptors has been assessed in line with the now withdrawn Pollution Prevention Guidance document PPG3, produced by the Environment Agency. An oil interceptor is not required for the proposed development.

Treatment within SuDS components is affected by the flow rate and volume of water which passes through the component. It is not reasonable or practical to treat the entirety of the runoff for infrequent greater intensity design storms. In any case the majority of the pollutants are removed from surfaces by the more frequent rainfall events and in the first flush resulting from the initial runoff from the larger events.
and to a certain capacity.

The following references have been used in the preparation of these calculations:

- SUDS Manual, CIRIA Report C753, 2015
- Pollution Mitigation Indicies provided by Hydro International

### Results Summary

**Roof Area:**

**Treatment component 1** Detention basin

**Treatment component 2** None

| Indices | Suspended | Metals | Hydrocarbons |
|---|---|---|---|
| Pollution Hazard | 0.2 | 0.2 | 0.05 |
| Pollution Mitigation | 0.5 | 0.5 | 0.6 |
| Treatment Suitability | Adequate | Adequate | Adequate |

**Residential Parking:**

**Treatment component 1** Detention basin

**Treatment component 2** None

| Indices | Suspended | Metals | Hydrocarbons |
|---|---|---|---|
| Pollution Hazard | 0.5 | 0.4 | 0.4 |
| Pollution Mitigation | 0.5 | 0.5 | 0.6 |
| Treatment Suitability | Adequate | Adequate | Adequate |

**Residential Roads**

**Treatment component 1** Detention basin
**Treatment component 2** None

| Indices | Suspended | Metals | Hydrocarbons |
|---|---|---|---|
| Pollution Hazard | 0.5 | 0.4 | 0.4 |
| Pollution Mitigation | 0.5 | 0.5 | 0.6 |
| Treatment Suitability | Adequate | Adequate | Adequate |

## POLLUTION HAZARD INDEX

| | | Pollution Hazard Indices | | |
|---|---|---|---|---|
| Source of Runoff | Pollution Hazard | Suspended Solids | Metals | Hydro-carbons |
| Residential roofing | Very low | 0.2 | 0.2 | 0.05 |

## POLLUTION MITIGATION INDEX

The receiving water body shall be: Surface Water

| | | Pollution Mitigation Indices | | |
|---|---|---|---|---|
| Suds Component | | Suspended Solids | Metals | Hydro-carbons |
| 1 | Detention basin | 0.5 | 0.5 | 0.6 |
| 2 | None | 0 | 0 | 0 |
| 3 | None | 0 | 0 | 0 |
| 4 | None | 0 | 0 | 0 |
| **Total Pollution Mitigation Index** | | **0.5** | **0.5** | **0.6** |

## ASSESSMENT OF TREATMENT PROPOSAL

| Indices | Suspended Solids | Metals | Hydro-carbons |
|---|---|---|---|
| Pollution Hazard | 0.2 | 0.2 | 0.05 |
| Pollution Mitigation | 0.5 | 0.5 | 0.6 |
| | Adequate | Adequate | Adequate |

## POLLUTION HAZARD INDEX

| | | Pollution Hazard Indices | | |
|---|---|---|---|---|
| Source of Runoff | Pollution Hazard | Suspended Solids | Metals | Hydro-carbons |
| Residential parking | Low | 0.5 | 0.4 | 0.4 |

## POLLUTION MITIGATION INDEX

The receiving water body shall be: Surface Water

| | | Pollution Mitigation Indices | | |
|---|---|---|---|---|
| Suds Component | | Suspended Solids | Metals | Hydro-carbons |
| 1 | Detention basin | 0.5 | 0.5 | 0.6 |
| 2 | None | 0 | 0 | 0 |
| 3 | None | 0 | 0 | 0 |
| 4 | None | 0 | 0 | 0 |
| **Total Pollution Mitigation Index** | | **0.5** | **0.5** | **0.6** |

## ASSESSMENT OF TREATMENT PROPOSAL

| Indices | Suspended Solids | Metals | Hydro-carbons |
|---|---|---|---|
| Pollution Hazard | 0.5 | 0.4 | 0.4 |
| Pollution Mitigation | 0.5 | 0.5 | 0.6 |
| | Adequate | Adequate | Adequate |

| R G PARKINS<br>Kendal \| 01539 729393 Lancaster \| 01524 32548 | CALCULATION | | Job No. | K40828 | Page | 4 of 4 |
|---|---|---|---|---|---|---|
| | Job | Arlecdon Parks | Drg no. | | Date | 13/12/2023 |
| | | Arlecdon | Revision | | Initial | CA |
| | Title | Sustainable Drainage - Treatment | | | Checked | OS |

## POLLUTION HAZARD INDEX

| | | Pollution Hazard Indices | | |
|---|---|---|---|---|
| Source of Runoff | Pollution Hazard | Suspended Solids | Metals | Hydro-carbons |
| Low traffic roads (e.g. residential roads and general access roads, < 300 traffic movements/day) | Low | 0.5 | 0.4 | 0.4 |

## POLLUTION MITIGATION INDEX

The receiving water body shall be: Surface Water

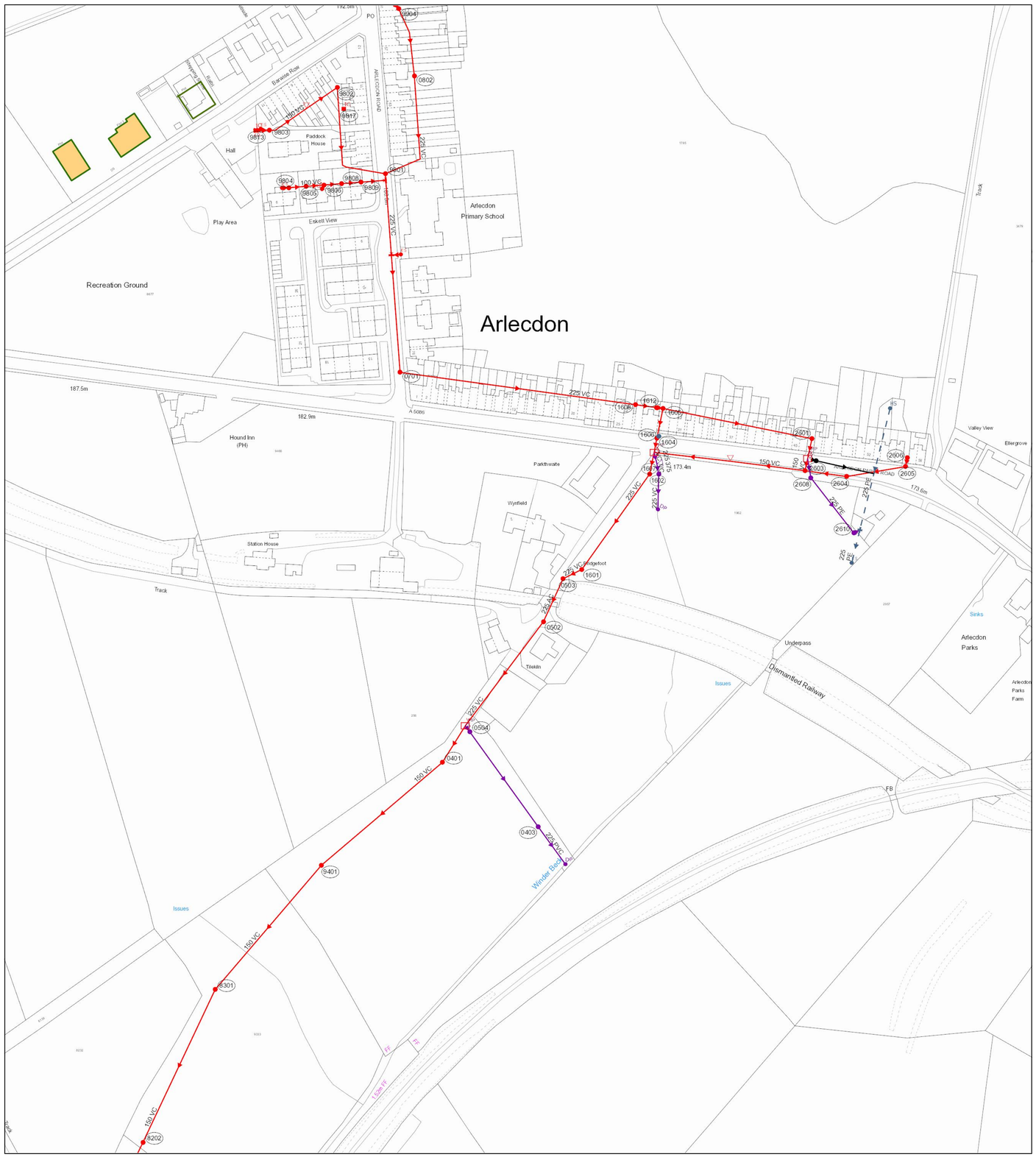
| | | Pollution Mitigation Indices | | |
|---|---|---|---|---|
| Suds Component | | Suspended Solids | Metals | Hydro-carbons |
| 1 | Detention basin | 0.5 | 0.5 | 0.6 |
| 2 | None | 0 | 0 | 0 |
| 3 | None | 0 | 0 | 0 |
| 4 | None | 0 | 0 | 0 |
| **Total Pollution Mitigation Index** | | **0.5** | **0.5** | **0.6** |

## ASSESSMENT OF TREATMENT PROPOSAL

| Indices | Suspended Solids | Metals | Hydro-carbons |
|---|---|---|---|
| Pollution Hazard | 0.5 | 0.4 | 0.4 |
| Pollution Mitigation | 0.5 | 0.5 | 0.6 |
| | Adequate | Adequate | Adequate |

# APPENDIX C

UU SEWER RECORDS




| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|
| 0904 | 169 | OV | 167.35 | 225 | | | VC | 65.02598 | 1 in 12 |
| 8301 | 166.1 | CO | 164.17 | 150 | | | VC | 93.64725 | 1 in 132 |
| 9808 | | CO | | 100 | | | VC | 10.99234 | |
| 1602 | 172.29 | CO | 170.74 | 225 | | | VC | 64.89544 | 1 in 61 |
| 9809 | | CO | | 100 | | | VC | 13.67951 | |
| 9801 | 189.02 | CO | 187.54 | 225 | | | VC | 110.4256 | 1 in 21 |
| 1605 | 173.38 | CO | 172.67 | 225 | | | VC | 84.26913 | 1 in 301 |
| 1608 | | CO | 182.26 | 225 | | | VC | 11.80374 | |
| 1605 | 173.38 | CO | 172.77 | 225 | | | VC | 16.85711 | 1 in 77 |
| 0401 | 168.39 | CO | 167.21 | 150 | | | VC | 88.10152 | 1 in 38 |
| 2605 | 173.39 | CO | 172.39 | 150 | | | VC | 33.14458 | 1 in 255 |
| 9804 | | CO | | 100 | | | VC | 9.46802 | |
| 0903 | 171.31 | CO | 169.61 | 225 | | | AC | 29.27501 | 1 in 51 |
| 9802 | 191.14 | CO | 189.57 | 225 | | | VC | 67.5054 | 1 in 34 |
| 1608 | | CO | | 225 | | | VC | 3.624847 | |
| 9904 | | CO | 0 | 225 | | | VC | 38.80199 | |
| 8202 | 165.11 | CO | 163.45 | 150 | | | VC | 80.94749 | 1 in 48 |
| 1601 | 171.08 | CO | 169.66 | 225 | | | VC | 11.5161 | 1 in 288 |
| 2608 | 173.1 | OV | 171.06 | 225 | | | PE | 38.72826 | 1 in 63 |
| 2606 | 173.51 | CO | 172.36 | 150 | | | VC | 5.007085 | |
| 9805 | | CO | | 100 | | | VC | 9.945448 | |
| 0701 | 183.5 | CO | 182.26 | 225 | | | VC | 131.7276 | |
| 0802 | | CO | 0 | 225 | | | VC | 67.1786 | |
| 2610 | 171 | OV | 170.45 | 225 | | | PE | 3.66722 | 1 in 73 |
| 9803 | 190.51 | CO | 189.93 | 150 | | | VC | 24.09681 | |
| 9806 | | CO | | 100 | | | VC | 9.749875 | |
| 2604 | 173.15 | CO | 172.24 | 150 | | | VC | 23.29641 | 1 in 212 |
| 2603 | 173.17 | CO | 172.07 | 150 | | | VC | 41.66211 | 1 in 73 |
| 0401 | 166.84 | CO | 164.89 | 150 | | | VC | 90.68787 | 1 in 128 |
| 1604 | 173.49 | CO | 172.54 | 225 | | | VC | 8.029458 | 1 in 12 |
| 0502 | 170.84 | CO | 169.08 | 225 | | | VC | 72.1 | 1 in 58 |
| 1607 | 171.98 | OV | 170.65 | 225 | | | VC | 19.56277 | |
| 0403 | 162.9 | OV | 161.47 | 225 | | | PVC | 25.50314 | 1 in 24 |
| 2601 | 173.48 | CO | 172.38 | 225 | | | VC | 11.37051 | 1 in 63 |

| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|

## LEGEND

Abandoned | Foul | Surface Water | Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

All point assets follow the standard colour convention:
red - combined  blue - surface water
brown - foul  purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

**MANHOLE FUNCTION**

| | |
|---|---|
| FO | Foul |
| SW | Surface Water |
| CO | Combined |
| OV | Overflow |

**SEWER SHAPE**

| | | | |
|---|---|---|---|
| CI | Circular | TR | Trapezoidal |
| EG | Egg | AR | Arch |
| OV | Oval | BA | Barrel |
| FT | Flat Top | HO | HorseShoe |
| RE | Rectangular | UN | Unspecified |
| SQ | Square | | |

**SEWER MATERIAL**

| | |
|---|---|
| AC | Asbestos Cement |
| BR | Brick |
| PE | Polyethylene |
| RP | Reinforced Plastic Matrix |
| CO | Concrete |
| CSB | Concrete Segment Bolted |
| CSU | Concrete Segment Unbolted |
| CC | Concrete Box Culverted |
| PSC | Plastic / Steel Composite |
| GRC | Glass Reinforecd Plastic |
| DI | Ductile Iron |
| PVC | Polyvinyl Chloride |
| CI | Cast Iron |
| SI | Spun Iron |
| ST | Steel |
| VC | Vitrified Clay |
| PP | Polypropylene |
| PF | Pitch Fibre |
| MAC | Masonry, Coursed |
| MAR | Masonry, Random |
| U | Unspecified |

**Address or Site Reference:**

Park Road Arlecdon,

**Scale:** 1:1250  **Date:** 28/11/2023

**Sheet:** 1 of 1

**Printed by:** Property Searches

**SEWER RECORDS**

United Utilities
Water for the North West

# APPENDIX D

SK DRAINAGE SOLUTIONS DRAINAGE SURVEY REPORT

DRAINAGE SOLUTIONS LTD

CCTV Inspection Report

# SURFACE WATER
# PROPOSED DEVELOPMENT
# ARLECDON PARKS ROAD

**17/06/2020**
**Approved By: S. OAKES**
**Job Number: SK 073/20 ARLECDON PARKS ROAD S/W**

SK Drainage Solutions

31 Adams Road, Workington, Cumbria, CA14 3YS
Tel: 01900 268189
office@skds.ltd

SK Drainage Solutions Ltd
31 Adams Road
Workington
Cumbria
CA14 3YS

# Project Information

| Job Number | Surveyed by (Operator) | Base Unit | Date |
|---|---|---|---|
| **SK 073/20 ARLECDON PARKS ROAD S/W** | **S. OAKES** | **VJ7B51U7GO** | **17/06/2020** |

Client Details:

MR SEAN CLOSE

Client Contact Name: SEAN CLOSE

Site Details:

SURFACE WATER
PROPOSED DEVELOPMENT
ARLECDON PARKS ROAD

Site Contact Name: SEAN CLOSE

Contractor Details:

SK Drainage Solutions Ltd
31 Adams Road
Workington
Cumbria
CA14 3YS

Office Contact Name: S. OAKES
Office Contact Number: 01900268189

Purpose of Survey:

SURVEY AND TRACE OF THE DRAINAGE UPSTREAM AND DOWNSTREAM OF THE MANHOLE ON ARLECDON PARKS ROAD.

CONCLUSION
THE MANHOLE REFERENCED CULVERT MH01 WOULD APPEAR TO HAVE BEEN BUILT ON THE ORIGINAL CULVERT. THE UPSTREAM AND DOWNSTREAM SECTIONS ARE OF BRICK CONSTRUCTION. BOTH DIRECTIONS HAVE LARGE AMOUNTS OF DEBRIS WHICH RESTRICTED PROGRESS DURING THE SURVEY. A DN300MM PIPE WAS NOTED AT ENTERING THE MH FROM THE LEFT. THIS IS CONNECTED TO MH02 WHICH IS LOCATE IN THE FOOTPATH ON THE OPPOSITE SIDE OF THE ROAD. THE ROAD GULLY IN THAT FOOTAPTH TAKES A 90 BEND AND JOINS THE CULVERT UPSTREAM OF CULVERT MH01. DYE WAS USED TO CONFIRM.
MH02 HAS TWO PIPES. THE TOP ONE IS A SEALED DN225MM VITRIFIED CLAY PIPE WHICH IS TAKING THE FOUL WATER. THE LOWER PIPE IS ALSO DN225MM VC BUT THIS CONNECTS TO CULVERT MH01.
THERE ARE TWO ROUND CHAMBERS IN THE FOOTAPATH. ONE ID THE FOUL CHAMBER WITH A PROBE. THERE IS A DN225MM PIPE SET AT A HIGHER LEVEL. THIS WAS SURVEYED BUT PROGRESSED STOPPED ON A LARGE DISPLACED JOINT WHICH PREVENTED PROGRESS. IT IS BELIEVED THIS PIPE IS AN OVERFLOW AND IS CONNECTED DOWNSTREAM OF THE CULVERT.
THE OTHER ROUND CHAMBER WAS ASSESS AND NO INLETS OR OUTLETS WERE NOTED. NO IDEA AS TO THE PURPOSE OF THIS CHAMBER.

| Job Number | Surveyed by (Operator) | Base Unit | Date |
|---|---|---|---|
| **SK 073/20 ARLECDON PARKS ROAD S/W** | **S. OAKES** | **VJ7B51U7GO** | **17/06/2020** |

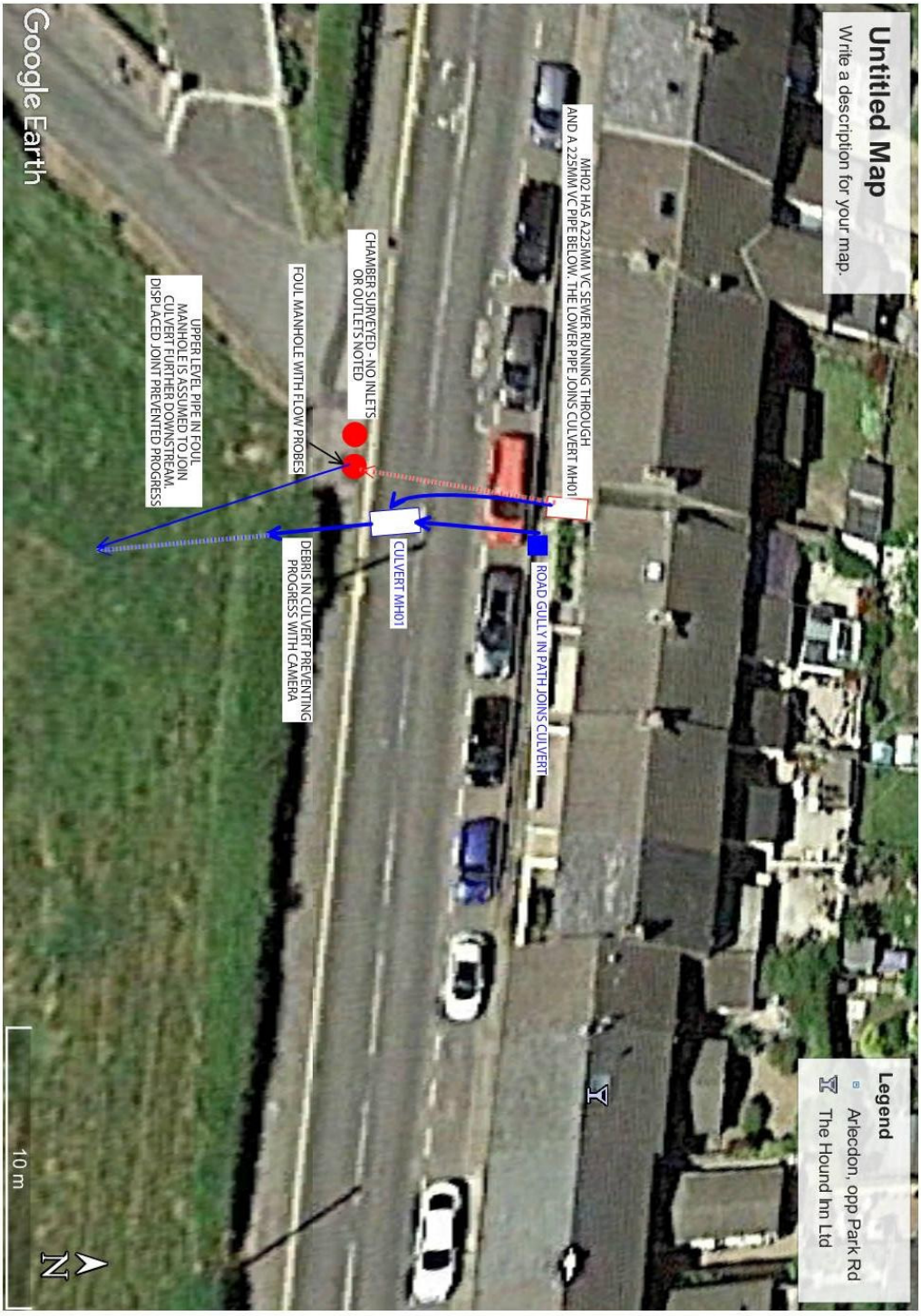
## Report Contents

SK Drainage Solutions Ltd
31 Adams Road
Workington
Cumbria
CA14 3YS

# Site Drawings/Photos

| Job Number | Surveyed by (Operator) | Base Unit | Date |
|---|---|---|---|
| **SK 073/20 ARLECDON PARKS ROAD S/W** | **S. OAKES** | **VJ7B51U7GO** | **17/06/2020** |

This sketch is not to scale and does not represent the exact routing of the drainage system



SK Drainage Solutions Ltd
31 Adams Road
Workington
Cumbria
CA14 3YS

# Site Photos

| Job Number | Surveyed by (Operator) | Base Unit | Date |
|---|---|---|---|
| **SK 073/20 ARLECDON PARKS ROAD S/W** | **S. OAKES** | **VJ7B51U7GO** | **17/06/2020** |

**Manhole** / **Access Point:** CULVERT MH01 Internal

**Manhole** / **Access Point:** MH02 Internal

SK Drainage Solutions Ltd
31 Adams Road
Workington
Cumbria
CA14 3YS

# CCTV Inspection Report

| Surveyed by (Operator) | Job Number | Pipe Length Reference(PLR) | Date | Pre Cleaned |
|---|---|---|---|---|
| **S. OAKES** | **SK 073/20 ARLECDON PARKS ROAD S/W** | **CULVERT MHX** | **17/06/2020** | **Not Cleaned** |
| Weather | Customer Present | Service Grade/Structural Grade | Base Unit | Section Number |
| **4 - Showers** | | **0/0** | **VJ7B51U7GO** | **1** |

Road **SURFACE WATER**
Place **PROPOSED DEVELOPMENT**
Location **ARLECDON PARKS ROAD**

Division
District
Location Details

Purpose
Duty **Surface water**
Catchment

Shape/Size **600mm**
Material **Brick**
Category

Start MH **CULVERT MH01**
End MH **OUTFALL**
Total length **0.11 metres**

Scale **1:0.00**
Direction **Downstream**

M/H Ref:CULVERT MH01 | I/L : metres

| Position | Code | Description | Photo | Type/Grade |
|---|---|---|---|---|
| 0.00 | MH | Start node type, manhole, reference CULVERT MH01 | 4183110 | Comment / 0 |
| 0.00 | WL | Water level 10% height/diameter | 4183112 | Comment / 0 |
| 0.11 | SA | Survey abandoned - Remark: UNABLE TO PASS DEBRIS | 4183115 | Comment / 0 |

M/H Ref:OUTFALL | I/L : metres

SK DRAINAGE SOLUTIONS LTD

SK Drainage Solutions Ltd
31 Adams Road
Workington
Cumbria
CA14 3YS

# CCTV Inspection Photos

| Job Number | Surveyed by (Operator) | Base Unit | Date |
|---|---|---|---|
| **SK 073/20 ARLECDON PARKS ROAD S/W** | **S. OAKES** | **VJ7B51U7GO** | **17/06/2020** |


Start node type, manhole, reference CULVERT MH01


Water level 10% height/diameter


Survey abandoned - Remark: UNABLE TO PASS DEBRIS

SK Drainage Solutions Ltd
31 Adams Road
Workington
Cumbria
CA14 3YS

# CCTV Inspection Report

| Surveyed by (Operator) | Job Number | Pipe Length Reference(PLR) | Date | Pre Cleaned |
|---|---|---|---|---|
| **S. OAKES** | **SK 073/20 ARLECDON PARKS ROAD S/W** | **NODE 1 X** | **17/06/2020** | **Not Cleaned** |
| Weather | Customer Present | Service Grade/Structural Grade | Base Unit | Section Number |
| **4 - Showers** | | **0/0** | **VJ7B51U7GO** | **2** |

Road **SURFACE WATER**
Place **PROPOSED DEVELOPMENT**
Location **ARLECDON PARKS ROAD**

Division
District
Location Details

Purpose
Duty **Surface water**
Catchment

Shape/Size **600mm**
Material **Brick**
Category

Start MH **CULVERT MH01**
End MH **NODE 1**
Total length **1.27 metres**

Scale **1:0.05**
Direction **Upstream**

M/H Ref:CULVERT MH01 | I/L : metres

| Position | Code | Description | Photo | Type/Grade |
|---|---|---|---|---|
| 0.00 | MH | Start node type, manhole, reference CULVERT MH01 | 4183118 | Comment / 0 |
| 0.00 | WL | Water level 10% height/diameter | 4183119 | Comment / 0 |
| 0.91 | REM | DN225MM NOTED IN DISTANCE | 4186692 | Comment / 0 |
| 1.27 | SA | Survey abandoned - Remark: ABANDONED DUE TO DEBRIS | 4183120 | Comment / 0 |

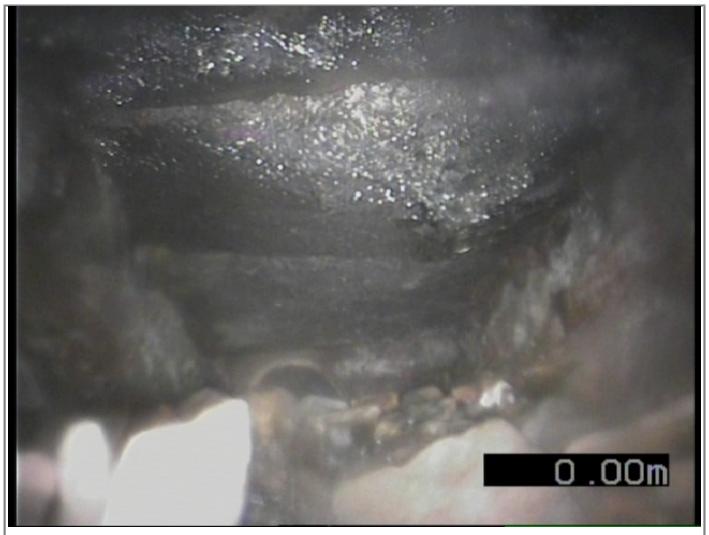
M/H Ref:NODE 1 | I/L : metres

SK DRAINAGE SOLUTIONS LTD

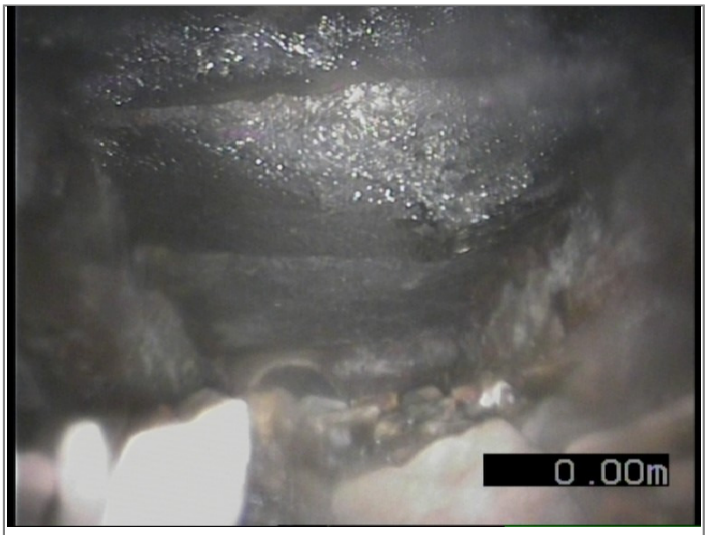
SK Drainage Solutions Ltd
31 Adams Road
Workington
Cumbria
CA14 3YS

# CCTV Inspection Photos

| Job Number | Surveyed by (Operator) | Base Unit | Date |
|---|---|---|---|
| **SK 073/20 ARLECDON PARKS ROAD S/W** | **S. OAKES** | **VJ7B51U7GO** | **17/06/2020** |




Start node type, manhole, reference CULVERT MH01




Water level 10% height/diameter


DN225MM NOTED IN DISTANCE


Survey abandoned - Remark: ABANDONED DUE TO DEBRIS

SK Drainage Solutions Ltd
31 Adams Road
Workington
Cumbria
CA14 3YS

# CCTV Inspection Report

| Surveyed by (Operator) | Job Number | Pipe Length Reference(PLR) | Date | Pre Cleaned |
|---|---|---|---|---|
| **S. OAKES** | **SK 073/20 ARLECDON PARKS ROAD S/W** | **MH02 X** | **17/06/2020** | **Not Cleaned** |
| Weather | Customer Present | Service Grade/Structural Grade | Base Unit | Section Number |
| **4 - Showers** | | **2/3** | **VJ7B51U7GO** | **3** |

Road **SURFACE WATER**
Place **PROPOSED DEVELOPMENT**
Location **ARLECDON PARKS ROAD**

Division
District
Location Details

Purpose
Duty **Surface water**
Catchment

Shape/Size **225mm**
Material **Vitrified clay**
Category

Start MH **MH02**
End MH **OUTFALL**
Total length **10.88 metres**

Scale **1:0.52**
Direction **Downstream**

M/H Ref:MH02 | I/L : metres

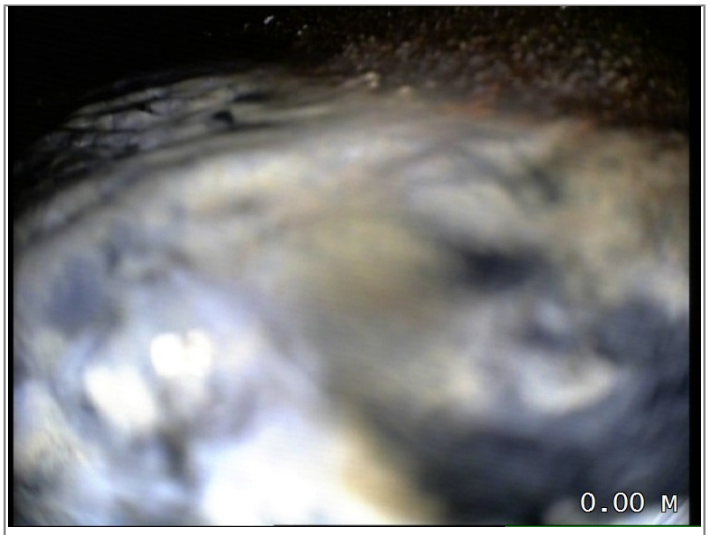
| Position | Code | Description | Photo | Type/Grade |
|---|---|---|---|---|
| 0.00 | MH | Start node type, manhole, reference MH02 | 4183122 | Comment / 0 |
| 0.00 | WL | Water level 5% height/diameter | 4183126 | Comment / 0 |
| 1.93 | FLJ | Fracture longitudinal at 12 o'clock, at joint | 4183128 | Structural / 3 |
| 2.14 | FL | Fracture longitudinal at 10 o'clock | 4183130 | Structural / 3 |
| 3.19 | DEEJ | Attached deposits, encrustation at 7 o'clock 5% cross-sectional area loss at joint | 4186702 | Service / 2 |
| 7.62 | FL | Fracture longitudinal at 12 o'clock | 4186703 | Structural / 3 |
| 10.88 | MHF | Finish node type, manhole, reference OUTFALL - CULVERT MH01 | 4183132 | Comment / 0 |

M/H Ref:OUTFALL | I/L : metres

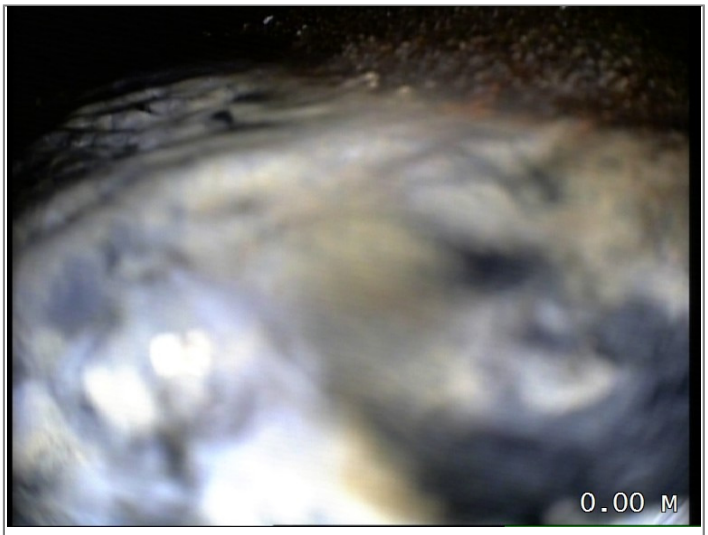
SK Drainage Solutions Ltd
31 Adams Road
Workington
Cumbria
CA14 3YS

# CCTV Inspection Photos

| Job Number | Surveyed by (Operator) | Base Unit | Date |
|---|---|---|---|
| **SK 073/20 ARLECDON PARKS ROAD S/W** | **S. OAKES** | **VJ7B51U7GO** | **17/06/2020** |




Start node type, manhole, reference MH02




Water level 5% height/diameter


Fracture longitudinal at 12 o'clock, at joint


Fracture longitudinal at 10 o'clock


Attached deposits, encrustation at 7 o'clock 5% cross-sectional area loss at joint


Fracture longitudinal at 12 o'clock

SK DRAINAGE SOLUTIONS LTD

SK Drainage Solutions Ltd
31 Adams Road
Workington
Cumbria
CA14 3YS

# CCTV Inspection Photos

| Job Number | Surveyed by (Operator) | Base Unit | Date |
|---|---|---|---|
| **SK 073/20 ARLECDON PARKS ROAD S/W** | **S. OAKES** | **VJ7B51U7GO** | **17/06/2020** |


Finish node type, manhole, reference OUTFALL - CULVERT MH01

SK Drainage Solutions Ltd
31 Adams Road
Workington
Cumbria
CA14 3YS

# CCTV Inspection Report

| Surveyed by (Operator) | Job Number | Pipe Length Reference(PLR) | Date | Pre Cleaned |
|---|---|---|---|---|
| **S. OAKES** | **SK 073/20 ARLECDON PARKS ROAD S/W** | **RGY01 IN PX** | **17/06/2020** | **Not Cleaned** |
| Weather | Customer Present | Service Grade/Structural Grade | Base Unit | Section Number |
| **4 - Showers** | | **0/0** | **VJ7B51U7GO** | **4** |

Road **SURFACE WATER**
Place **PROPOSED DEVELOPMENT**
Location **ARLECDON PARKS ROAD**

Division
District
Location Details

Purpose
Duty **Surface water**
Catchment

Shape/Size **150mm**
Material **Vitrified clay**
Category

Start MH **RGY01 IN PATH**
End MH **MH02**
Total length **1.74 metres**

Scale **1:0.05**
Direction **Downstream**

M/H Ref:RGY01 IN PATH | I/L : metres

| Position | Code | Description | Photo | Type/Grade |
|---|---|---|---|---|
| 0.00 | GY | Start node type, gully, reference RGY01 IN PATH | 4183133 | Comment / 0 |
| 0.00 | WL | Water level 0% height/diameter | 4183134 | Comment / 0 |
| 1.74 | BRF | Finish node type, major connection without manhole, reference MH02 CULVERT | 4183135 | Comment / 0 |

M/H Ref:MH02 | I/L : metres

SK Drainage Solutions Ltd
31 Adams Road
Workington
Cumbria
CA14 3YS

# CCTV Inspection Photos

| Job Number | Surveyed by (Operator) | Base Unit | Date |
|---|---|---|---|
| **SK 073/20 ARLECDON PARKS ROAD S/W** | **S. OAKES** | **VJ7B51U7GO** | **17/06/2020** |


Start node type, gully, reference RGY01 IN PATH


Water level 0% height/diameter


Finish node type, major connection without manhole, reference MH02 CULVERT

SK Drainage Solutions Ltd
31 Adams Road
Workington
Cumbria
CA14 3YS

# CCTV Inspection Report

| Surveyed by (Operator) | Job Number | Pipe Length Reference(PLR) | Date | Pre Cleaned |
|---|---|---|---|---|
| **S. OAKES** | **SK 073/20 ARLECDON PARKS ROAD S/W** | **FWMH01 X** | **17/06/2020** | **Not Cleaned** |
| Weather | Customer Present | Service Grade/Structural Grade | Base Unit | Section Number |
| **4 - Showers** | | **0/1** | **VJ7B51U7GO** | **5** |

Road **SURFACE WATER**
Place **PROPOSED DEVELOPMENT**
Location **ARLECDON PARKS ROAD**

Division
District
Location Details

Purpose
Duty **Foul**
Catchment

Shape/Size **225mm**
Material **Vitrified clay**
Category

Start MH **FWMH01**
End MH **OUTFALL**
Total length **10.36 metres**

Scale **1:0.52**
Direction **Downstream**

M/H Ref:FWMH01 | I/L : metres

| Position | Code | Description | Photo | Type/Grade |
|---|---|---|---|---|
| 0.00 | MH | Start node type, manhole, reference FWMH01 | 4183136 | Comment / 0 |
| 0.00 | WL | Water level 0% height/diameter | 4183137 | Comment / 0 |
| 10.36 | JDL | Joint displaced large | 4183138 | Structural / 1 |
| 10.36 | SA | Survey abandoned - Remark: UNABLE TO PASS JOINT | 4183139 | Comment / 0 |

M/H Ref:OUTFALL | I/L : metres

SK DRAINAGE SOLUTIONS LTD

SK Drainage Solutions Ltd
31 Adams Road
Workington
Cumbria
CA14 3YS

# CCTV Inspection Photos

| Job Number | Surveyed by (Operator) | Base Unit | Date |
|---|---|---|---|
| **SK 073/20 ARLECDON PARKS ROAD S/W** | **S. OAKES** | **VJ7B51U7GO** | **17/06/2020** |


Start node type, manhole, reference FWMH01


Water level 0% height/diameter


Joint displaced large


Survey abandoned - Remark: UNABLE TO PASS JOINT

SK Drainage Solutions Ltd
31 Adams Road
Workington
Cumbria
CA14 3YS

# Structural Defects (SRM 4)

| Job Number | Surveyed by (Operator) | Base Unit | Date |
|---|---|---|---|
| **SK 073/20 ARLECDON PARKS ROAD S/W** | **S. OAKES** | **VJ7B51U7GO** | **17/06/2020** |

| No. | PLR | Dir. | Use | Shape/Size | Date | Mat. | Total Length | Inspection Length | Cat. | Peak Score | Grade | Mean Score | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CULVERT MHX | D | S | 600 | 17/06/2020 | Brick | 0.11 metres | 0.11 | | 0 | 1 | 0 | 0 |
| 2 | NODE 1 X | U | S | 600 | 17/06/2020 | Brick | 1.27 metres | 1.27 | | 0 | 1 | 0 | 0 |
| 3 | MH02 X | D | S | 225 | 17/06/2020 | Vitrified clay | 10.88 metres | 10.88 | | 40 | 3 | 11.03 | 120 |
| 4 | RGY01 IN PX | D | S | 150 | 17/06/2020 | Vitrified clay | 1.74 metres | 1.74 | | 0 | 1 | 0 | 0 |
| 5 | FWMH01 X | D | F | 225 | 17/06/2020 | Vitrified clay | 10.36 metres | 10.36 | | 2 | 1 | 0.19 | 2 |

SK Drainage Solutions Ltd
31 Adams Road
Workington
Cumbria
CA14 3YS

# Service Defects (SRM 4)

| Job Number | Surveyed by (Operator) | Base Unit | Date |
|---|---|---|---|
| **SK 073/20 ARLECDON PARKS ROAD S/W** | **S. OAKES** | **VJ7B51U7GO** | **17/06/2020** |

| No. | PLR | Dir. | Use | Shape/Size | Date | Mat. | Total Length | Inspection Length | Cat. | Peak Score | Grade | Mean Score | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CULVERT MHX | D | S | 600 | 17/06/2020 | Brick | 0.11 metres | 0.11 | | 0 | 1 | 0 | 0 |
| 2 | NODE 1 X | U | S | 600 | 17/06/2020 | Brick | 1.27 metres | 1.27 | | 0 | 1 | 0 | 0 |
| 3 | MH02 X | D | S | 225 | 17/06/2020 | Vitrified clay | 10.88 metres | 10.88 | | 1 | 2 | 0.09 | 1 |
| 4 | RGY01 IN PX | D | S | 150 | 17/06/2020 | Vitrified clay | 1.74 metres | 1.74 | | 0 | 1 | 0 | 0 |
| 5 | FWMH01 X | D | F | 225 | 17/06/2020 | Vitrified clay | 10.36 metres | 10.36 | | 0 | 1 | 0 | 0 |

SK Drainage Solutions Ltd
31 Adams Road
Workington
Cumbria
CA14 3YS

# Report Summary

| Job Number | Surveyed by (Operator) | Base Unit | Date |
|---|---|---|---|
| **SK 073/20 ARLECDON PARKS ROAD S/W** | **S. OAKES** | **VJ7B51U7GO** | **17/06/2020** |

## Job Information

Total Distance Surveyed: **24.36 metres**
Engineer: **S. OAKES**
Number of Surveys: **5**
Number of Surveys grade 4 or above: **0**

## Job Comments

PLEASE REFER TO NOTES AND SURVEY COMMENTS

## Section 1 Overview (17/06/2020)

Manholes: **CULVERT MH01 to OUTFALL**
Pipe Length: **0.11 metres**
Structural Grade: **0**
Service Grade: **0**
Material: **Brick**
Pipe Size: **600mm**
Use: **Surface water**

DEBRIS IN CULVERT PREVENTING PROGRESS

## Section 2 Overview (17/06/2020)

Manholes: **CULVERT MH01 to NODE 1**
Pipe Length: **1.27 metres**
Structural Grade: **0**
Service Grade: **0**
Material: **Brick**
Pipe Size: **600mm**
Use: **Surface water**

DEBRIS RESTRICTING PROGRESS

## Section 3 Overview (17/06/2020)

Manholes: **MH02 to OUTFALL**
Pipe Length: **10.88 metres**
Structural Grade: **3**
Service Grade: **2**
Material: **Vitrified clay**
Pipe Size: **225mm**
Use: **Surface water**

NUMEROUS DEFECTS. APPEARS TO BE TRACES OF FOUL DEBRIS IN WATER

## Section 4 Overview (17/06/2020)

Manholes: **RGY01 IN PATH to MH02**
Pipe Length: **1.74 metres**
Structural Grade: **0**
Service Grade: **0**
Material: **Vitrified clay**
Pipe Size: **150mm**
Use: **Surface water**

PIPE TAKES A 90 BEND AND JOINS CULVERT UPSTREAM OF CULVERT MH01

## Section 5 Overview (17/06/2020)

Manholes: **FWMH01 to OUTFALL**
Pipe Length: **10.36 metres**
Structural Grade: **1**
Service Grade: **0**
Material: **Vitrified clay**
Pipe Size: **225mm**
Use: **Foul**

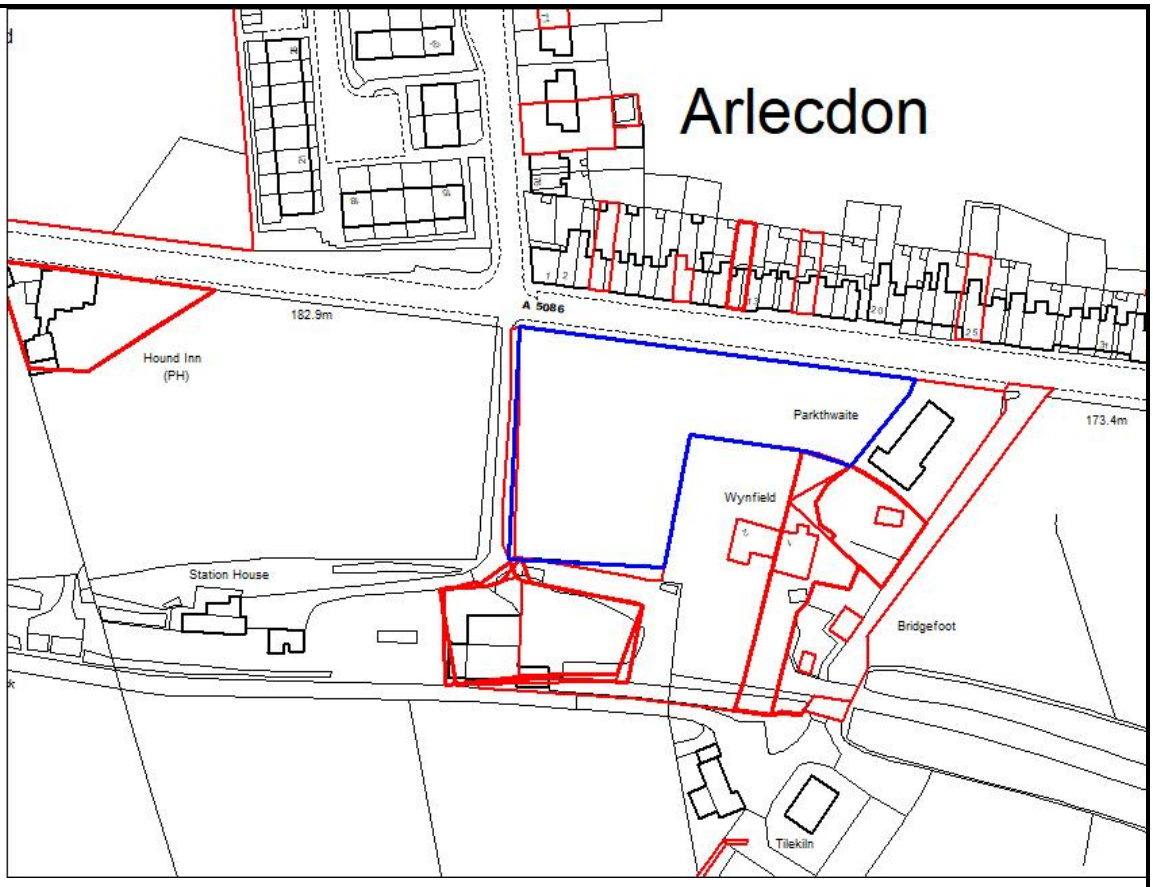
BELIEVE THIS PIPE IS FOR AN OVERFLOW TO THE FOUL AND IS CONNECTED DOWNSTREAM OF CULVERT MH01.
LARGE DISPLACED JOINT AT 10.36M PREVENTING PROGRESS

# APPENDIX E

COPELAND BOROUGH COUNCIL PLANNING PANEL OUTLINE APPROVAL

| | |
|---|---|
| **To: PLANNING PANEL** | **Development Control Section** |
| **Date of Meeting: 16/12/2020** | |

| | |
|---|---|
| **Application Number:** | 4/18/2504/0O1 |
| **Application Type:** | Outline : CBC |
| **Applicant:** | Mr S Close |
| **Application Address:** | LAND OFF ARLECDON PARKS ROAD, ARLECDON, FRIZINGTON |
| **Proposal** | OUTLINE APPLICATION FOR THE ERECTION OF 9 DWELLINGS INCLUDING LAYOUT WITH PROPOSED NEW ACCESS |
| **Parish:** | Arlecdon and Frizington |
| **Recommendation Summary:** | Approve in Outline (commence within 3 years) |






## Reason for Determination by Planning Panel

This application is brought for consideration by Members of the Planning Panel given the significant level of local interest in this proposal.

## Introduction

This application relates to a greenfield site comprising an area of 0.39 hectares which fronts onto Arlecdon Parks Road (A5086). The site has residential development to the east and south and a small access road to the west which serves Station House. It lies opposite a terraced row of cottages that front directly onto Arlecdon Parks Road. The site slopes down from north to south and is currently bound by a mature hedgerow.

## Proposal

This application seeks outline planning permission to develop the site for residential purposes. Full details of layout and access have been submitted with the application for

approval at this stage, with all matters relating to scale, appearance and landscaping reserved for future consideration

The development will consist of 9 dwellings which are to be arranged in a cul-de-sac with access to be achieved directly from Arlecdon Parks Road. The north eastern portion of the site, adjacent to the dwellings known as "Parkthwaite and Winfield" will be utilized to house an underground storage tank for the attenuation of surface water run-off.

The application is accompanied by the following:

- Site Location Plan;
- Proposed Drainage Scheme and Drainage calculations
- Ground Investigation for Soil Infiltration Analysis
- Topographic and detail survey
- Preliminary Ecological Survey and Hedge Survey;
- Design and Access Statement.

**Relevant Planning Application History**

Outline application for house, refused in July 2002, application reference 4/02/0506/0 relates;

Two bungalows, application withdrawn in 1993, application reference 4/93/0140/0 relates.

**Consultation Responses**

Arlecdon and Frizington Parish Council

The Parish Council raised concerns regarding access to the proposed development onto a busy main road. Such development would be more appropriate towards the centre of the village. Finally the Parish Council questions the need for more Executive Housing in the parish.

Cumbria Highways

No objections.

Local Lead Flood Authority

Initial response stated that it is not clear that the site is suitable for drainage using soakaways and it is not clear what the sustainable drainage system would be, given the site falls away from the highway any exceedance route would be across third party land therefore I would request that further details of the surface water drainage arrangements are submitted as supporting information to this application.

Further to the receipt of plans showing the surface water draining into the existing adopted sewer, the following questions were raised:

1) Details of the connection to the manhole from the pond, is there spare capacity for this connection to be made.

2) Exceedance route for the surface water system from the pond.

3) Exceedance route for the water from the road and dwellings.

4) Due to the site being so wet it needs to be established what is the cause of this and what can be done to manage it.

The exceedance routes need to be safe.

The Agent responded that the exceedance flows would be put into the highway drain, however this request was refused by the Highways Maintenance team.

Further discussions were undertaken with the Applicant to show foul water discharged at the downstream of the combined sewer overflow system and the surface water discharging to a new manhole located on an existing culvert which joins with the UU combined sewer east of Parkthwaite. This was considered to be acceptable.

United Utilities

Initially raised no objections to the proposal subject to conditions with relation to the provision of a full surface water drainage plan. Further to the receipt of plans to show the water draining into an existing adopted sewer, United Utilities objected to any surface water discharging into the public sewer directly or indirectly.

Further discussions were undertaken with the Applicant to show foul water discharged at the downstream of the combined sewer overflow system and the surface water discharging to a new manhole located on an existing culvert which joins with the UU combined sewer east of Parkthwaite. This was considered to be acceptable but requires consent United Utilities for the connection.

Flood and Coastal Defence Engineer

20th December 2018

There isn't a reason from a flood risk perspective that the development cannot proceed, as it lies in Flood Zone 1 and is at a very low risk of surface water flooding.

Being outline, at this stage, there isn't much detail and the applications states that the surface water will be disposed of by means of a soakaway and SUDS.

Even if infiltration is feasible, careful consideration of the siting of soakaways is need, with respect to existing properties downslope.

I would expect that given the nature of the site and the general appearance of land in the area, infiltration would be unlikely to be a feasible means of disposing of surface water.

This would mean that an alternative means of disposing of surface water would be required.

The preferred method would be to a watercourse and one is situated a short distance to the east of the site.

This would require access across third party land, some of which has existing development on.

Due to the existing development, it may not be feasible to construct a surface water system to this watercourse and alternative routing, which could be through the former railway embankment.

The final alternative for surface water would be to connect to the public sewer and United Utilities does not have to accept the surface water, should it choose not to.

It is likely that the existing land is heavily waterlogged and any development may suffer from surface water and groundwater issues as a result.

Consequently, the applicant would need to consider finished floor levels, potential cut off drains and surface water flow routes.

Other than problems relating to a watercourse and culvert at Arlecdon Parks Road, I am not aware of any formal complaints about drainage or flooding in the immediate vicinity of the site.

However, I do believe that there has been issues in the vicinity of the adjacent development, but have no detail.

The applicant needs to fully understand the potential problems outlined above and would ask that the following be answered at this stage:

- Has permeability (percolation) testing been undertaken on site? (If it has, I would assume that results are satisfactory.)
- If infiltration is not feasible, has the alternative means of surface water disposal been considered?
- If so, are these methods feasible and/or viable financially?
- Has the issue of potential groundwater and surface water been considered?
- Has the effect of the development on neighbouring development been considered in terms of how it will affect the existing drainage/flooding issues?

Whilst the applicant may not want to consider these at present, there may be something that could prove to make to proposed development unfeasible or financially unviable.

4th February 2019

I strongly object to the proposed development, as there isn't any information on how the surface water can be adequately disposed of without increasing the existing flooding and drainage problems to adjacent properties.

Despite the flood risk highlighted by mapping, there is a lot of problems of flooding in the area, with the proposed development site being cited as the source of much of the water. Nothing with the application mentions this and there isn't much detail with the application about the disposal of the surface other than soakaway and SUDS.

Given the nature of the land it is highly unlikely that infiltration will be suitable for the disposal of any surface water. Downslope problems of surface water and groundwater flooding would only be made worse.

Although there is a watercourse nearby, I have been informed that this floods and can fill the surrounding field up to adjacent properties. It would appear to be unsuitable to accept additional surface water.

I also understand that the existing combined sewer is at capacity and won't be able to accept any further surface of foul water.

5th September 2019

Further to the submission of information to show the surface water being connected and drained through an existing adopted sewer, the following comments were received:

- It is not surprising that the ground is not suitable for infiltration, based on observation, as already there are large amounts of surface water running off causing problems to adjacent properties.
- There is a surface water body nearby, but this would require crossing third party land and I understand that the watercourse in question already causes flooding in the area.
- The preferred option for the developer is to dispose of surface water into the combined sewer.
- Has United Utilities been contacted to see if it would accept additional surface water into the system?
- I understand that the existing United Utilities combined system that the developer is proposing to connect into already has capacity issues.
- As the proposed system is likely to remain private, what is the proposal for future maintenance of the system?

Based on the existing problems of surface water running off site, I also have the following comments/questions:

- As mentioned, there is a significant amount of surface water running off the site at present causing problems to existing properties.
- NPPF calls for development to improve the existing situation, or as a minimum, not make the situation worse.
- What is the developer proposing to do to reduce the effects of surface water running off the site?
- What are the plans for dealing with surface water generation during the construction phase, as this is likely to be greater, silt laden and construction of the proposed sewers requires deep trenches?

I have no reason based on the latest information to remove my objection to the proposed development.

17th October 2019

I object to the proposed development on grounds that it is proposed to dispose of the surface water by means of the combined sewer and there is no identified means of reducing natural surface water run-off from the development, particularly during construction, when it is likely to be laden with silt.

With the receipt of further information from the Agent, the following response was received:

Despite the flood risk highlighted by mapping, there is a lot of problems of flooding in the area, with the proposed development site being cited as the source of much of the water.

Further information has now been submitted, which indicates that infiltration is not as suitable means of disposal of the surface water.

It is now proposed that the surface water is disposed of into the existing foul sewer. This is be using a connection from the attenuation tank into the foul sewer from the development and continuing forward as a combined sewer to the existing combined sewer in the field to the east of the proposed development.

Existing downslope natural surface water issues need to be fully addressed, as construction work can increase run off through vegetation clearance, changes in ground levels and general disturbance of the ground.

Adjacent to the combined sewer is a culverted watercourse, which opens up into an open section within the same field as the combined sewer. As excavations will be undertaken to create a route for the foul sewage, there is no reason why the surface water cannot be conveyed in the same excavations to the culvert or open watercourse.

23rd October 2019

With regards to the above proposed change of having the surface water discharge separately and into the UU combined overflow, this is an improvement on what had previously been proposed.

However, there are still a number of considerations that have yet to be overcome:

- United Utilities will need to approve the discharge of surface water into their combined sewer overflow, this is both the physical connection and the flow rate.
- If this is not acceptable, is feasible to discharge the surface water into the open watercourse?
- Is the foul sewage from the site to be offered up for adoption by United Utilities?
- If not, then an easement to cross third party land will be required.
- Is the surface water from the site to be offered up for adoption by United Utilities?
- If not, then an easement to cross third party land will be required.

- Cumbria County Council now ask for flow routes in the case of a design exceedance event.
- A construction management plan will still be needed, which would need to include means of dealing with surface water during construction.
- However, this can be included as a condition if planning permission is granted.
- A means of dealing with residual surface water off site is needed.
- However, this can be included as a condition if planning permission is granted.

7th August 2020

Further discussions were undertaken with the Applicant to show foul water discharged at the downstream of the combined sewer overflow system and the surface water discharging to a new manhole located on an existing culvert which joins with the UU combined sewer east of Parkthwaite. Subject to all consents and easements being in place, no objections were raised.

30th November 2020

There are a number of existing issues with surface water and drainage in this location.

In summary, based on my understanding of the situation, which includes information from an objector, there are a number of points to consider:

- Existing properties downslope of the proposed development suffer from flooding and drainage issues.
- Some of this will be direct surface runoff from the site due to saturation of the land.
- Development of the site will include impermeable surfaces, which will increase run off.
- The increased runoff is accounted for in the drainage design.
- Storage has been factored into the development.
- The residual permeable areas of the site will be reduced, consequently there will be less surface water runoff due to saturation, which can affect downslope properties, post development.
- The proposed development is to include bunding, which will direct surface water runoff from existing properties downslope.
- Consequently the development will provide betterment in terms of reduced surface water runoff to downslope properties.
- Surface water drainage is to be directed to an existing culvert.
- This culvert is known to be in a poor condition and surcharge in the field downslope of properties.
- Responsibility for this lies with the riparian landowner.
- The highway drainage system along the A5086 in this location is reported to surcharge and cause flooding affecting existing properties downslope of the proposed development.
- This system is understood to discharge into the same culvert upstream of the proposed connection from the development.
- Issues with the highway drainage system are the responsibility of Cumbria Highways.

- There is a United Utilities combined sewer overflow, which discharges into the culvert/open watercourse.
- Any issues with this system are the responsibility of United Utilities.
- The site is be connected to the culvert by means of a new manhole.
- The surface water drainage from the site will pass through approximately 30m of culvert before exiting to an open watercourse.
- The surface water drainage from the development will be to the same catchment post development as pre development.
- Subject to necessary approvals and detailed drainage design, the development itself should improve matters.
- Other works relating to flooding and drainage issues are outside the control of the applicant and should be addressed by the appropriate responsibly party.

I have concerns, but as the issues that need to be addressed are outside the control of the developer, I am not raising an objection.

I'm just concerned that there should really be more understanding of the existing problems first.

Strategic Planning Policy Team

The Council can now demonstrate a five year supply of deliverable housing sites as identified in the Housing Land Supply Position Paper 2020, however as stated above one of the most important policies relating to the application is partly out-of-date as it no longer accords fully with the NPPF. Given this, the tilted balance in paragraph 11 of the NPPF is engaged and the application should only be refused if any adverse impacts significantly and demonstrably outweigh the benefits.

Scientific Officer

The proposed site for development appears to be on a greenfield site, however historic maps show that it was immediately adjacent to a coal depot and the railway. Given the sensitive end use of the development it would be appropriate to attach a standard contaminated land condition, such as:

> *No development approved by this planning permission or such other date or stage in the development as may be agreed in writing by the Local Planning Authority, shall take place until a scheme that includes the following components to deal with the geotechnical and contaminative risks detailed in the Preliminary Environmental Risk Assessment shall each be submitted to and approved, in writing, by the local planning authority:*
>
> 1) *Site investigation scheme, based on the Preliminary Environmental Risk Assessment to provide information for a detailed assessment of the risk to all receptors that may be affected, including those off-site.*
> 2) *The results of the site investigation and detailed risk assessment referred to in 1) and, based on these, an options appraisal and remediation strategy giving full*

*details of the remediation or mitigation measures required and how they are to be undertaken.*

3) *A verification plan providing details of the data that will be collected in order to demonstrate that the works set out in the remediation strategy in 2) are complete and identifying any requirements for longer term monitoring of pollutant linkages , maintenance and arrangement for contingency action.*

*Any changes to these components require the express written consent of the Local Planning Authority. The scheme shall be implemented as approved.*

Given the predominantly greenfield nature of the site it is likely that the contaminated land process will not need to progress beyond the initial intrusive investigation.

Strategic Housing Manager

Happy to support this small development. As it is under 10 units, will not provide a formal response but positive to see it coming through as growth is a major element of our Housing Strategy.

Natural England

No comments.

Force Crime Prevention Design Advisor

I wish to make the following observations which I have considered from a crime prevention perspective.

The dwellings are generally laid out to overlook the access roads and each other, without compromising privacy.

The comments in the Design and Access Statement Item 4 (Design for Crime) are noted. In the event of an application for full permission being submitted, it would be helpful if the applicant addresses the following issues, in order to reduce the opportunities for crime and to demonstrate compliance with Policy DM10 (Achieving Quality of Place) and Policy ST1 D ii (Strategic Development Principles) of the Local Plan:

- The formation of front curtilages to clearly define public and private spaces
- The formation of rear/side garden boundaries to deter intrusion
- Resident and visitor car parking provision that is easily supervised
- Landscaping scheme that does not impede views or create hiding places as it matures
- Street lighting scheme utilising high uniformity and colour rendition values to promote confidence and reassurance in the public realm
- Dwelling exterior lighting scheme to make any intruder prominent
- (Dwelling) specification of exterior doors and windows to resist forced entry
- (Garage) specification of vehicle entry doors to resist forced entry

I shall be pleased to advise on any crime prevention issues arising from this application.

Public Representation

The application has been advertised by way of a site notice, press notice and neighbour notification letters issued to 48 no. properties.

27 letters of objection have been received from 19 properties which raise the following concerns:

- Concerns over highway safety;
- Concerns regarding drainage and surface water due to previous flooding on and off the site;
- Potentially contaminated land due to a suspected old tile works;
- The allocation should be removed as the assessments were not extensive enough;
- Previous planning applications have been refused on the site;
- No demonstrable need for the development;
- The proposal will create noise and light pollution affecting the amenity of neighbouring properties;
- Construction works would cause a danger to the public and vehicles;
- No construction access has been identified and the lane to the west of the site is part owned by a different owner;
- Concerns regarding parking;
- Views over the Lakeland Fells will be spoiled;
- Increase in traffic and congestion;
- The existing properties would have a loss in value;
- Arlecdon Parks Road is dangerous with vehicles exceeding the speed limit, therefore the access will not be safe;
- Many species of wildlife would lose their habitat;
- The approval of this application would set a precedent for further development in Arlecdon;
- Plots 7, 8 and 9 are too low to connect to the main sewage system;
- Arlecdon is not well connected with little public transport options;
- Car journeys would be necessary from this location;
- Plots 3, 4 and 7 will create overlooking issues;
- Surface water is likely to drain onto Wynfields;
- There is poor lighting on Arlecdon Parks Road;
- The site is very boggy;
- Many neighbouring properties already experience flooding;
- The existing hedgerows are home to many species of wildlife;
- There are limited services in Arlecdon;
- The location of the water tank is too close to properties as it could do damage to surrounding properties;
- The field drain already backs up and will be worsened by the proposal;
- There is a lack of trust in the planning process;
- The drainage passes through third party land with no permission to do so;

- The access to the drainage scheme is through a third party property and permission is not granted to use this;
- School bus pick up points will be blocked making it dangerous for children crossing the road safely.

**Planning Policies**

Planning law requires applications for planning permission must be determined in accordance with the Development Plan unless material considerations indicate otherwise.

Development Plan

Copeland Local Plan 2013-2028 (Adopted December 2013)

Policy ST1 – Strategic Development Principles

Policy ST2 – Spatial Development Strategy

Policy SS1 – Improving the Housing Offer

Policy SS2 – Sustainable Housing Growth

Policy SS3 – Housing Needs, Mix and Affordability

Policy T1 – Improving Accessibility and Transport

Policy ENV1 – Flood Risk and Risk Management

Policy ENV3 – Biodiversity and Geodiversity

Policy ENV5 – Protecting and Enhancing the Borough's Landscapes

Development Management Policies (DMP)

Policy DM10 – Achieving Quality of Place

Policy DM11 – Sustainable Development Standards

Policy DM12 – Standards for New Residential Development

Policy DM22 – Accessible Developments

Policy DM24 – Development Proposals and Flood Risk

Policy DM25 – Protecting Nature Conservation Sites, Habitats and Species

Policy DM26 – Landscaping

Copeland Local Plan 2001-2016 (LP):

Saved Policy TSP8 - Parking Requirements

Proposals Map including settlement boundaries.

**Other Material Planning Considerations**

National Planning Policy 2019 (NPPF)

National Design Guide (NDG).
Cumbria Development Design Guide (CDG)

Strategic Housing Market Assessment 2019 (SHMA)

Cumbria Landscape Character Guidance and Toolkit (CLCGT)

The Conservation of Habitats and Species Regulations 2017 (CHSR).

Copeland Borough Council Site Allocations and Policies Plan 2016/17: Site Profiles (SAPP).

Emerging Copeland Local Plan:

The emerging Copeland Local Plan 2017-2035 has recently been subject to a Preferred Options Consultation which ended on 30th November 2020. The Preferred Options Consultation builds upon the completed Issues and Options Consultation which finished in January 2020. Given the stage of preparation, the emerging Copeland Local Plan 2017-2035 has only limited weight in decision making, but provides an indication of the direction of travel of the emerging planning policies, which themselves have been developed in accordance with the provisions of the National Planning Policy Framework.

**Assessment**

Introduction

The main issues resulting from the application are the principle of the development, housing need, impacts on settlement character and local landscape, impacts on neighbouring amenity, highway safety, flood risk and drainage, ground conditions and ecology and trees. These have been considered fully in the following assessment.

Principle of Development

The principle of new housing is supported in the Copeland Local Plan though strategic policies ST1 and ST2 along with policy SS1. These policies seek to promote sustainable development to meet the needs and aspirations of the boroughs housing market, as well as having consideration for the requirements of smaller settlements within the Borough which respect their scale and function.

Arlecdon is classified as a Local Centre under Policy ST2. Policy ST2 seeks to support appropriately scaled development in defined Local Centres which helps to sustain services and facilities for local communities. In respect of housing development, the following is identified as appropriate: within the defined physical limits of development as appropriate; possible small extension sites on the edges of settlement; housing to meet general and local needs; and, affordable housing and windfall sites.

The site lies outside the designated settlement boundary which is defined by Arlecdon Parks Road and as such, the proposal is in conflict with Policy ST2. Policy ST2 of the CS states that outside of the defined settlement boundaries, development is restricted to that which has a proven requirement for such a location, including… *housing that meets proven specific and local needs including provision for agricultural workers, replacement dwellings, replacement of residential caravans, affordable housing and the conversion of rural buildings to residential use.*

In the context of the provisions of Paragraph 11, the defined development boundary for Arlecdon/Rowrah must be considered out of date.

Paragraph 11 of the NPPF sets out that planning permission should be granted unless:

i. the application of policies in the NPPF that protect areas or assets of particular importance provides a clear reason for refusing the development proposed; or

ii. any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in the NPPF taken as a whole.

The site lies within the existing settlement of Arlecdon and is considered to be within walking distance from the local services within the village which include a primary school, Church, pub, Post Office and shop. On this basis, dwellings in this situation are considered to be sustainable.

In applying the provisions of Paragraph 11:

- The Site would assist in boosting housing supply to meet the identified need for housing in Arlecdon and the wider Borough;
- the proposed development comprising the erection of nine dwellings is appropriate in size to the designation of Arlecdon/Rowrah as a Local Centre in accordance with the spatial objectives of Policy ST2;
- The Site is located next to a cluster of existing residential properties on the edge of the built up area of the village;
- the Site is located in close and convenient proximity to the services and employment opportunities located within Arlecdon/Rowrah for which the settlement has been designated as a Local Centre in Policy ST2 of the CS. The proposed development will support existing services and thus the aspiration of retaining these services;
- Some sustainable travel options exist within the vicinity, with a limited bus route serving the settlement and local cycle routes providing linkages to the National Cycle Network Route 71 as per the provisions of Policy DM22 of the DMP.

Emerging Local Plan

Arlecdon is identified as a Local Service Centre in the Local Plan Preferred Options Draft (Policy H4PO) and the application site is identified as draft housing allocation HAR2. Both policies have unresolved objections, and given this, and the fact that the Plan is still at an early stage, very little weight can be given to these policies according to Paragraph 48 of the NPPF.

The Preferred Options Draft is accompanied by a Housing Allocations Profile document. This identifies a number of issues and constraints on the site which would need to be addressed before development could come forward. These are as follows:

- Potential sewer capacity issues
- Potential surface water issues
- Potential for ground contamination
- Electrical infrastructure may need reinforcement
- Any development should ensure that sufficient off street parking is provided to avoid increased parking on the A5086
- Suitable access will need to be demonstrated

Housing Need

Arlecdon/Rowrah falls within the Whitehaven Housing Market Area (HMA) of Copeland Strategic Housing Market Assessment (SHMA).

The SMHA suggest a particular focus on the delivery of three bedroom houses, semi-detached and detached houses with four or more bedrooms and bungalows and is identified as having a high need for new affordable housing.

The proposed development has the potential to assist in providing a greater balance of market housing stock within Arlecdon/Rowrah; however, does not include provision for affordable housing to meet the identified need in accordance with the provisions of Policy SS3 of CS and Paragraph 61 of the NPPF.

Settlement Character, Landscape Impact and Visual Impact

The Site is located in an area of Sub Type 5a Ridge and Valley landscape as defined in the Cumbria Landscape Character Guidance and Toolkit (CLCGT).

The Key Characteristics of the land comprise: a series of ridges and valleys that rises gently toward the limestone fringes of the Lakeland Fells; well managed regular shaped medium to large pasture fields; hedge bound pasture fields dominate, interspersed with native woodland, tree clumps and plantations; scattered farms and linear villages found along ridges; and, large scale structures generally scarce.

The Guidelines for development include: discouraging the further nucleation of the settlement pattern; ensuring new development makes a contribution to the character of the

area by respecting the form of villages e.g. linear along ridge lines, creates new focal spaces and takes advantage of attractive long views; and, carrying out village enhancement schemes including townscape environmental improvements, tree planting and establishment of attractive green spaces.

The Site comprises an area of undeveloped land located to the south of Arlecdon Parks Road, adjacent to a small cluster of existing housing.

The settlement of Arlecdon is centred around Arlecdon Road, which runs approximately north-south and connects to the Arlecdon Parks Road, which runs approximately east-west and transitions into the settlement of Rowrah.

Arlecdon Road is principally characterised by linear frontage development on both sides of the highway, with some nucleated estate type development to the north and south, which is at odds with the general overall form.

Arlecdon Parks Road is characterised by linear frontage development to the north, with open agricultural land and limited sporadic dwellings enclosed by a former railway embankment and planting to the south. Expansive views of the wider landscape to the south exist from Arlecdon Parks Road.

The undeveloped land to the south of Arlecdon Parks Road contributes positively to the character of Arlecdon. The proposed development by virtue of its scale and location would be at odds with the prevailing form of development in this area of the settlement. The development would both urbanise and erode the rural character of this area of the settlement to its detriment. The development would limit the expansive open views of the Lakeland Foothills and Western Fells beyond, which contribute positively to the character of the area and are important locally.

In wider landscape terms, given the location of the Site, the existing development to the north of Arlecdon Parks Road and local landscape features, the landscape harm and visual impacts of the development would be limited to a local level.

<u>Impact on Residential Amenity</u>

The application site lies adjacent to residential properties to both the east and south with terraced properties to the north on the opposite side of Arlecdon Parks Road. The nearest of these properties is 2 Wynfield which is sited approximately 18 metres from the boundary of the site.

The application includes details of the proposed plot layout only with details of the scale and appearance of the dwellings reserved for subsequent approval at the Reserved Matters stage. As submitted the proposed plot layout does reasonably allow for adequate separation distances to be achieved between facing elevations of the proposed and existing dwellings as required by Policy DM12 of the Local Plan. It is also considered that suitable boundary treatments can be secured as part of this permission to minimse the potential impact on the existing property. Details of the boundary treatment would be submitted at the reserved matters planning stage.

On this basis it is therefore considered that the proposal can reasonably meet with the requirements of Policy DM12 and further details with regards to design and appearance will be assessed during any subsequent applications.

Access, Parking and Highway Safety

Access to the development is proposed off Arlecdon Parks Road from a single road opposite 7 Arlecdon Parks Road. The access road will lead south to the 4 plots at the lowest point in the site and to a hammerhead junction. The development proposes a ratio of at least 2 off road car parking spaces per dwelling which includes visitor parking.

Objections have been received raising concerns with regards to cars parking on the highway and the access being unsafe. Local residents are concerned that cars do not adhere to the speed limit and that the main road is used as a rat run for Sellafield workers. Furthermore, local residents have raised concerns that there are existing parking issues along Arlecdon Parks Road and that the development would worsen this issue.

Notwithstanding these concerns, the Cumbria Highways Authority has raised no objections to the access and on-site parking arrangement proposed. It is considered that the addition of 9 dwellings on this site is unlikely to have a material effect on the highway and the visibility at the proposed access is sufficient for this stretch of road which is restricted to 30mph. There is off street parking proposed for each property, therefore it is anticipated that this would be utilized as opposed to parking on Arlecdon Parks Road.

Overall, it is considered that the submitted details comply with Policies T1 and DM22 of the Copeland Local Plan and will provide an accessible development with an acceptable parking provision.

Flood Risk and Drainage

The Site is located within Flood Zone 1. The proposed comprises a more vulnerable use and is therefore a compatible use in Flood Zone 1.

The site consists of marshy grassland and local concerns have been raised about drainage issues.

The application was initially submitted without any details of drainage, other than the proposal for the foul drainage to connect to the existing sewer and the provision of soakaways for each dwelling. Historic flooding issues on and around the site raised concerns amongst both statutory consultees and local neighbouring residents. Due to the gradient of the site which falls away from the highway, any exceedance routes would be across third party land and the route uphill increases the difficulty of drainage solutions. Although the Agent suggested that surface water drainage could be dealt with via a planning condition, it was considered that this was a fundamental issue and should be dealt with at the outline stage as a lack of a solution would make the development unacceptable.

A summary of the information that has been submitted with regards to drainage is set out below:-

Drainage Plan Amendment 1 – 27th August 2019

A drainage plan was submitted to show that there are no surface water bodies near to the site suitable for connection. A United Utilities network was identified on land east of the property Parkthwaite and it was considered that a connection could be achieved to this pipe, with short term attenuation storage. This relied on the owner of Parkthwaite allowing an outfall pipe to extend through their land. The scheme would require a 120m3 storage tank to be sited on the land to the east of the development with exceedance and runoff pipes to run throughout the site to serve each property. The storage tank would connect to a swale for secondary treatment before running through Parkthwaite to a new manhole on the existing culvert opposite 31 Arlecdon Parks Road. A bund was proposed to surround the existing properties at Winfield and Parkthwaite in order to protect these properties against any failure of the water storage system. A number of questions were raised by the Councils Flood and Coastal Defence Engineer (response received 5th September 2019) and United Utilities ultimately rejected the scheme as the additional water flows to the combined sewer could increase the risk of premature spill into the local stream.

27th November 2019

A meeting was held between the Local Lead Flood Authority, the Flood and Coastal Defence Engineer, the Agent for the application and the Applicant's Drainage Engineer. A possible solution was discussed with regards to a connection being made from the site to the existing highway drain.

17th March 2020

The Cumbria Highways Maintenance Team confirmed that they were not agreeable to any changes or connections to the highway drain.

Drainage Plan Amendment 2 – 7th July 2020

A revised drainage plan was received with calculations to show outfall rates from the site. The plan detailed that the proposed foul and surface water systems would remain private and maintained by the Developer and that foul water would connect directly to the United Utilities combined system with surface water connecting to the existing surface water culvert on site. A swale is shown on the site boundary edge near to Parkthwaite which would provide secondary treatment to attenuated runoff. An overflow pipe would accommodate roadway runoff and a temporary filter drain would be in situ in front of plots 4-7 to minimize potential surface water runoff down the site during the construction phase. The outfall is proposed to cross third party land, with their permission.

The Local Lead Flood Authority requested further bolstering of the hedge dyke to the rear of plots 8 and 9 to direct surface water away from adjacent land and direct it to the exceedance system, amend the size and location of the gullys and provide additional drainage at the private lane end of the site to prevent any exceedance water from draining down the lane.

Drainage Plan Amendment 3 – 29th July 2020

The Applicant's Drainage Engineer considered these points and amended the plans as requested. On further consultation, the Council's Flood and Coastal Drainage Engineer raised no objections, subject to all consents and easements being in place. The Local Lead Flood Authority requested a gully at the end of the road at the turning head to catch the highway water running onto the private parking bays in order to make sure that the plans were acceptable.

Drainage Plan Amendment 4 – 11th August 2020

The gully was added to the plan as requested and this was considered to be acceptable by the Local Lead Flood Authority. United Utilities responded that the surface water proposals are acceptable in principle, however the foul water proposed to be discharged to their combined sewer outflow is unacceptable and therefore they object to the proposal as submitted. They stated that under no circumstance should foul water discharge into the combined sewer outflow and the overflow pipe directly. Their preferred method is for a foul connection point of discharge to be the downstream pipe of the combined sewer overflow.

Drainage Plan Amendment 5 – 17th August 2020

On receipt of this objection, the Applicant's Drainage Engineers confirmed that United Utilities considered that they were connecting to the overflow pipe, which they confirmed was not the case. The foul water would be connected to the UU chamber in the footway which continues onward in a southerly direction, not the overflow pipe which is at a high level in this chamber. A further plan was submitted to confirm this. United Utilities responded that in order to make a connection to this network, the network catchment team would have to be consulted for assessment. They suggested options for a suitable connection and the Applicant's Drainage Engineer opted to construct a new manhole and associated saddle connection downstream of the CSO.

Drainage Plan Amendment 6 – 3rd September 2020

The final plan was considered to be acceptable by United Utilities in principle, however they stated that the applicant will have to apply for a formal sewer connection. The Council's Flood and Coastal Drainage Engineer commented that although there is an existing issue with the culvert which is known to be in poor condition, this is outside the Applicant's control and ultimately the proposal should provide for the existing drainage issues on and around the site.

This scheme was considered to be acceptable by all statutory consultees, however it relies on the plot layout to remain as submitted for it to function correctly

As these details have the potential for change when influenced by the design process, it is considered reasonable for a condition to be added to any approval to ensure that a suitable drainage solution is submitted to and approved prior to any construction works commencing on site. As this is an outline application and the Applicant has demonstrated

that a scheme can work for the site, it is considered that the LPA authority cannot request further detail at this stage.

Overall, subject to the imposition of conditions on any permission that require the agreement to a suitable drainage proposal it is considered that the proposal complies with Policies ENV1 and DM24 of the Copeland Local Plan with regards to drainage.

Ground Conditions

The application was submitted without any information relating to ground contamination. Due to the proximity of the site to an adjoining coal depot and disused railway and the sensitive end use of the development, the Council's Scientific Officer considered that a pre-commencement condition should be added to any approval to ensure that appropriate site investigations are undertaken. It is considered that this should also alleviate the concerns of an objector who has raised land contaminated as an issue on the site.

As this is an outline application, this detail can be considered at the reserved matters stage and any remediation necessary can be identified and implemented prior to the commencement of any works relating to the housing development on site.

Ecology and Trees

The application is accompanied by a Preliminary Ecological Appraisal and Hedge Survey. The submitted information describes the site as "marshy grassland" with some conservation interest, however states that the areas of these habitats are small. The report considers that there is an opportunity to create a species-rich grassland area to offset the loss of these habitats. The hedge has moderate conservation value with the removal of sections considered to be of moderate impact. The invasive plant species Montbretia is present on site and there are some habitats with suitability for use by bats, birds and other species.

Overall, it is considered that there is some ecological merit to the site and that any effect resulting from the proposed development should be mitigated and managed. The report details suitable mitigation and enhancement measures, all of which should be undertaken before, during and after development. These mitigation measures can be secured by use of an appropriately worded planning conditions attached to any planning permission.

Natural England have raised no objections to the proposal. Subject to the imposition of conditions to ensure that the appropriate mitigation is undertaken, it is considered that the proposal complies with policies ENV3 and DM25 of the Copeland Local Plan.

Local objections

A significant level of local objection has been raised to the application. The concerns relating to material planning considerations have been addressed within the report as set out above. A number of other issues relating to loss of property value, loss of view and ownership and private access issues are not material planning considerations and therefore cannot be considered as part of the decision making process.

Planning Balance and Conclusion

The Application Site is located out with the settlement boundary for Arlecdon/Rowrah as defined in Policy ST2 of the CS in partial conflict with the provisions of the policy.

The provisions of Policy ST2 of the CS relating to settlement boundaries must be considered out of date and Paragraph 11 of the NPPF must be applied.

The development will clearly: assist in boosting housing supply; is of appropriate scale for a Local Centre; will support the retention of existing services locally and benefits from some limited sustainable travel options in accordance with the spatial objectives of Policy ST2 of the CS.

The identified conflict with Policy ST2 in respect of the location out with the defined development boundary must be given limited weight only. The site is identified in the Preferred Options Consultation Draft as being a site suitable for housing. Whilst this draft cannot be given weight in the decision making process at the current time it provides an indication of the direction of travel of the emerging planning policies, which themselves have been developed in accordance with the provisions of the National Planning Policy Framework

The development by virtue of its location and scale would however result in some adverse impacts upon the developed form and character of the settlement of Arlecdon to its detriment. The development will also adversely impact upon locally important views from the settlement to the Lakeland Foothills and Western Fells beyond. In wider landscape terms, given the location of the Site, the existing development to the north of Arlecdon Parks Road and local landscape features, the landscape harm and visual impacts of the development would be limited to a local level.

There are identified existing flooding issues on and around the site, although a suitable drainage scheme has been identified which satisfies the requirements of the statutory consultees. This is adequate for an outline planning application.

On balance, the adverse impacts upon the landscape settlement character of Arlecdon is not considered to significantly and demonstrably outweighed the benefits of the proposal which would deliver 9 dwellings in a sustainable location within an existing village when assessed against the policies in this Framework taken as a whole.

**Recommendation:-**

Approve in Outline (commence within 3 years) subject to the following conditions

**Conditions**

1. The scale, appearance and landscaping shall be as may be approved by the Local Planning Authority.

Reason

To comply with Section 92 of the Town and Country Planning Act 1990 as amended by the Planning and Compulsory Purchase Act 2004.

2. Detailed plans and drawings with respect to the matters reserved for subsequent approval shall be submitted to the Local Planning Authority within three years of the date of this permission and the development hereby permitted shall be commenced not later than the later of the following dates:-

a) The expiration of THREE years from the date of this permission

Or

b) The expiration of TWO years from the final approval of the reserved matters or, in the case of approval on different dates, the final approval of the last such matter to be approved.

Reason

To enable the Local Planning Authority to control the development in detail and to comply with Section 92 of the Town and Country Planning Act 1990, as amended by the Planning and Compulsory Purchase Act 2004.

3. Permission shall relate to the following plans and documents as received on the respective dates and development shall be carried out in accordance with them: -

Site Location Plan, scale 1:1250, drawing number SC/1/18, received 20th November 2018;
Topographic and detail survey, scale 1:100, drawing number RevB, received 20th November 2018;
Proposed Drainage Scheme, scale 1:200, drawing number D1196/01 rev E, received 3rd September 2020;
Ground Investigation for Soil Infiltration Analysis, written by GEO Environmental Engineering, received 9th October 2019;
Drainage calculations, drawing number D1196/SW1 to SW3, received 9th October 2019;
Preliminary Ecological Appraisal and Hedge Survey, written by Openspace, received 20th November 2018;
Design and Access Statement, received 20th November 2018.

Reason

To conform with the requirement of Section 91 of the Town and Country Planning

Act 1990, as amended by the Planning and Compulsory Purchase Act 2004.

4. Prior to the commencement of any development on the site full details of the foul water and surface water drainage scheme, including attenuation measures must be submitted to and approved in writing by the Local Planning Authority. The approved scheme must become operational before any part of the development is brought into use and must be so maintained at all times thereafter.

Reason

To ensure a satisfactory scheme of surface and foul water disposal from the site in accordance with policies ENV1 and DM24 of the Copeland Local Plan.

5. No development approved by this planning permission or such other date or stage in the development as may be agreed in writing by the Local Planning Authority, will take place until a scheme that includes the following components to deal with the geotechnical and contaminative risks detailed in the Preliminary Environmental Risk Assessment must each be submitted to and approved, in writing, by the local planning authority:

*I.* Site investigation scheme, based on the Preliminary Environmental Risk Assessment to provide information for a detailed assessment of the risk to all receptors that may be affected, including those off-site.

*II.* The results of the site investigation and detailed risk assessment referred to in 1) and, based on these, an options appraisal and remediation strategy giving full details of the remediation or mitigation measures required and how they are to be undertaken.

*III.* A verification plan providing details of the data that will be collected in order to demonstrate that the works set out in the remediation strategy in 2) are complete and identifying any requirements for longer term monitoring of pollutant linkages , maintenance and arrangement for contingency action.

Any changes to these components require the express written consent of the Local Planning Authority. The scheme must be implemented as approved.

Reason

To ensure that risks from land contamination to the future users of the land and neighbouring land are minimised, together with those to controlled waters, property and ecological systems, and to ensure that the development can be carried out safely without unacceptable risks to workers, neighbours and other off site receptors in accordance with Policy ST1 of the Copeland Local Plan.

6. All works on site must be carried out in accordance with the good practice, harm avoidance, mitigation and recommendations outlined in the submitted Preliminary Ecological Appraisal and Hedge Survey, written by OpenSpace and received on 20th November 2018.

   Reason

   In order to protect any biodiversity on the site in accordance with Policies ENV3 and DM25 of the Copeland Local Plan.

7. A native hedgerow shall be planted along the western boundary of the site in accordance with details which have been submitted to and approved in writing by the Local Planning Authority. The hedgerow shall be planted in accordance with the approved details in the first available planting season following the occupation of the units on the plots along the western boundary of the site.

   Reason

   In accordance with the recommendations set out in the submitted Preliminary Ecological Appraisal and Hedge Survey, written by OpenSpace and received on 20th November 2018 and in accordance with policies ENV3 and DM25 of the Copeland Local Plan.

8. Prior to the commencement of development on the site, protection measures for the hedgerows to be retained as part of the development must be implemented in accordance with the details set out in the submitted Preliminary Ecological Appraisal and Hedge Survey, written by OpenSpace and received on 20th November 2018. These measures must be retained for the whole construction phase of the development.

   Reason

   In accordance with the recommendations set out of in the Preliminary Ecological Appraisal and Hedge Survey and in accordance with policies ENV3 and DM25 of the Copeland Local Plan.

9. Prior to the commencement of development on site, a detailed Management Plan for the control and management of the invasive species on the site must be submitted to and approved in writing by the Local Planning Authority. Development must be carried out in accordance with the approved plan at all times thereafter.

   Reasons

To protect the ecological interests evident on the site and in accordance with policies ENV3 and DM25 of the Copeland Local Plan.

10. Notwithstanding the provisions of the Town and Country Planning (General Permitted Development) Order 2015 (or any order revoking or re-enacting that order with or without modification) no external alterations (including replacement windows and doors) or extensions, conservatories, dormer, or enlargement shall be carried out to the dwellings, nor shall any detached building, enclosure, domestic fuel containers, pool or hardstandings be constructed within the curtilage other than those expressly authorised by this permission.

Reason

To safeguard the character and appearance of the development in the interests of visual amenity and in accordance with policy DM12 of The Copeland Local Plan.

**Statement**

The Local Planning Authority has acted positively and proactively in determining this application by assessing the proposal against all material considerations, including planning policies and any representations that may have been received, and subsequently determining to grant planning permission in accordance with the presumption in favour of sustainable development as set out in the National Planning Policy Framework.