



Proposed Residential Development  
Alloa Park Phase 9

Drainage Strategy Report

March 2021

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## 1 Introduction

- 1.1 Dougall Baillie Associates (DBA) have been appointed by Allanwater Developments to prepare a Drainage Strategy Report in support of a planning application to Clackmannanshire Council for Phase 9 of residential development and the relocation of the existing Alloa Rugby Club playing pitches at the wider Alloa Park development to the south east of the town of Alloa.
- 1.2 The following report will provide an insight into how the drainage serving the proposed development can be managed in a sustainable manner to meet the requirements of Clackmannanshire Council (CC), Scottish Water (SW) and the Scottish Environment Protection Agency (SEPA).

### Relevant Guidance and Publications

- 1.3 To develop a meaningful Drainage Impact Assessment, the following legislative frameworks, guidance and documentation have been considered -
- Flood Risk Management (Scotland) Act 2009
  - Scottish Planning Policy (Scottish Government 2014)
  - Flood Prevention and Land Drainage (Scotland) Act 1997
  - Planning Advice Note 69 (PAN69) - Planning and Building Standards Advice on Flooding (Scottish Executive 2004)
  - Planning Advice Note 79 (PAN79) - Water and Drainage (Scottish Executive 2006)
  - CIRIA C624 “Development and Flood Risk” (Construction Industry Research and Information Association 2004)
  - SEPA Guidance “Technical Flood Risk Guidance for Stakeholders (Version 12)” (Scottish Environmental Protection Agency 2019)
  - The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (As Amended)
  - SEPA Guidance “Climate Change Allowances for Flood Risk Assessment in Land Use Planning” (Scottish Environment Protection Agency 2019)
  - CIRIA C753 “The SUDS Manual” (Construction Industry Research and Information Association 2015)
  - Sewers for Scotland 4th Edition (Scottish Water October 2018)

## 2 Baseline Conditions

### Site Description

- 2.1 The site forms an irregular plot of greenfield land associated with Alloa Rugby Club located to the south-east of the town of Alloa. The site is characterised by existing sports pitches, a club house, hardstanding area for car parking and public open space.
- 2.2 The site is bound to the north and west by Forth Crescent, to the east by phase 7 of development and the disused St Mungo's Primary School and to the south by Phase 8A&B of development and existing residential properties associated with Earl's Court. The proposed development site covers an area of approximately 9.3 hectares and is centred on National Grid Reference NS 89188 92190.

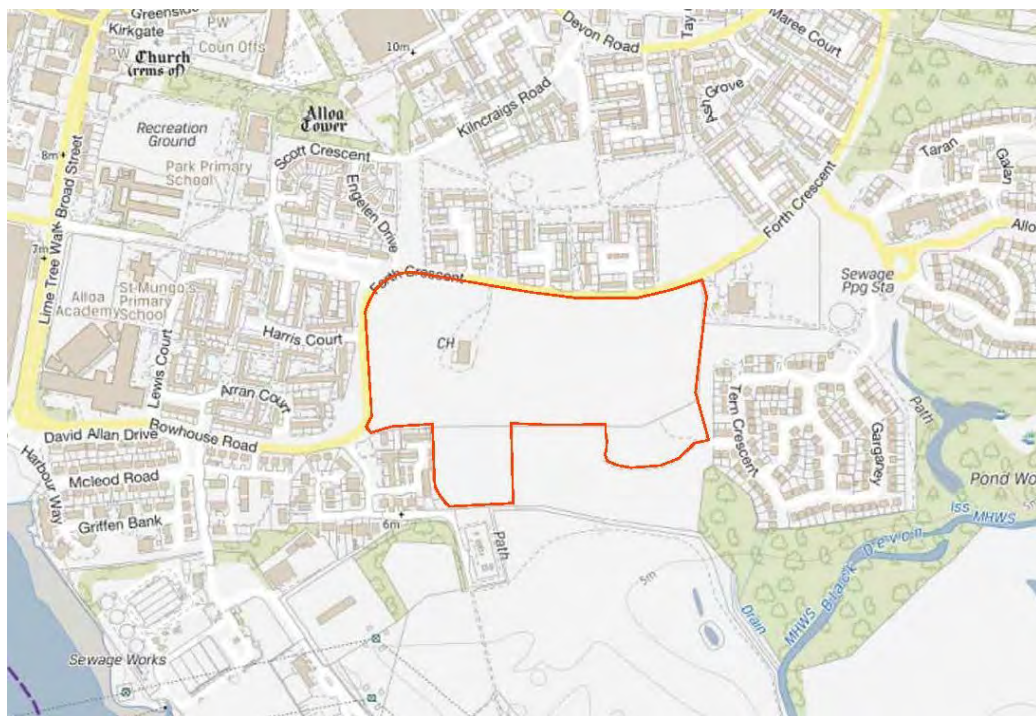


Figure 2-1 - Location Plan

### Development Proposals

- 2.3 It is proposed to relocate the existing rugby pitches and provide 2 new grass pitches and a covered synthetic pitch in the western extent of the site. The relocation of the rugby pitches will then provide the land for 85 new units on with associated roads and access, landscaping, open space, parking and supporting infrastructure. A copy of the indicative development masterplan is attached in Appendix A.

### Topography

- 2.4 Review of the topographic survey of the site notes that the site is predominately flat in nature, with a slight fall to the south-west from the north across the

site. The site high point is noted along the northern site boundary at a level of 7.6mAOD, with the low point noted to the south-west at a level of 6.0mAOD. A copy of the topographic survey for the site is attached in Appendix B.

#### Ground Conditions

- 2.5 A review of the British Geological Survey geology maps for the area was undertaken to determine the underlying geology of the site.
- 2.6 The maps suggest that the superficial deposits overlying the site consist of Raised Tidal Flat Deposits Of Holocene Age - Silt and clay. This sedimentary superficial deposit formed between 12 thousand years ago and the present during the Quaternary period.
- 2.7 The bedrock geology of the site was noted to consist of Passage Formation - Sedimentary rock cycles, clackmannan group type. This sedimentary bedrock formed between 318 and 328 million years ago during the Carboniferous period
- 2.8 It is recommended that ground conditions should be confirmed through a detailed site investigation report.

#### Existing Hydrological Regime

- 2.9 The development site falls within the natural drainage catchment of the Black Devon watercourse which passes the site approximately 400m to the south-east. The Black Devon originates approximately 17.4km to the east from runoff from the Cleish Hills.
- 2.10 The Black Devon is a tributary of the River Forth which it joins approximately 1.7km to the south ,however the River Forth is located approximately 500m to the south-west of the site at its closest point.

### 3 **Proposed Drainage Strategy**

#### Existing Sewer Networks

- 3.1 Review of the Scottish Water Record Plans notes that the area is drained via a mixture of combined and separate sewer systems. A combined sewer flows from east to west along Forth Crescent, before changing direction and flows south through the western extent of the development site. This sewer is noted as being 450mm diameter. A culverted natural watercourse is also noted to flow east to west along Forth Crescent before flowing south west traversing the western extent of the site where the relocated rugby pitches will be positioned.
- 3.2 Phase 7 and 8 to the east and south of the site is shown to be drained on a separate sewer basis with some sewers noted to be adopted and some sewers shown gold which notes that that the sewers have received technical approval from Scottish Water however are either not yet constructed or adopted. A copy of the Scottish Water Asset Plans for the area is attached in Appendix C.

#### Masterplan Drainage Principles

- 3.3 As this is phase 9 of the wider development there has already been some infrastructure drainage designed and installed to accommodate this phase of development.
- 3.4 Masterplan Drainage for Phase 7, 8 and 9 was designed as part of the detailed design package for phase 7. Surface water flows from phase 7, 8 & 9 discharge to the south east of the development site where flows receive treatment via a detention basin and then detention pond constructed in series. The surface water then discharges to the Black Devon.
- 3.5 Foul flows from phase 7 discharge to the east to a foul drainage network from a previous phase of development with foul flows from phase 8&9 flowing to a foul pump station to the south east of phase 8.
- 3.6 At the time of the masterplan drainage design phase 9 only consisted of 51 units, however the masterplan has changed with the relocation of the rugby pitches to the west creating additional development land within phase 9 increasing the unit numbers to 85.
- 3.7 The additional capacity required to accommodate the increase in development content is addressed in the following sections of this report. Figure 3-1 below gives an overview of the masterplan for phases 7,8&9.

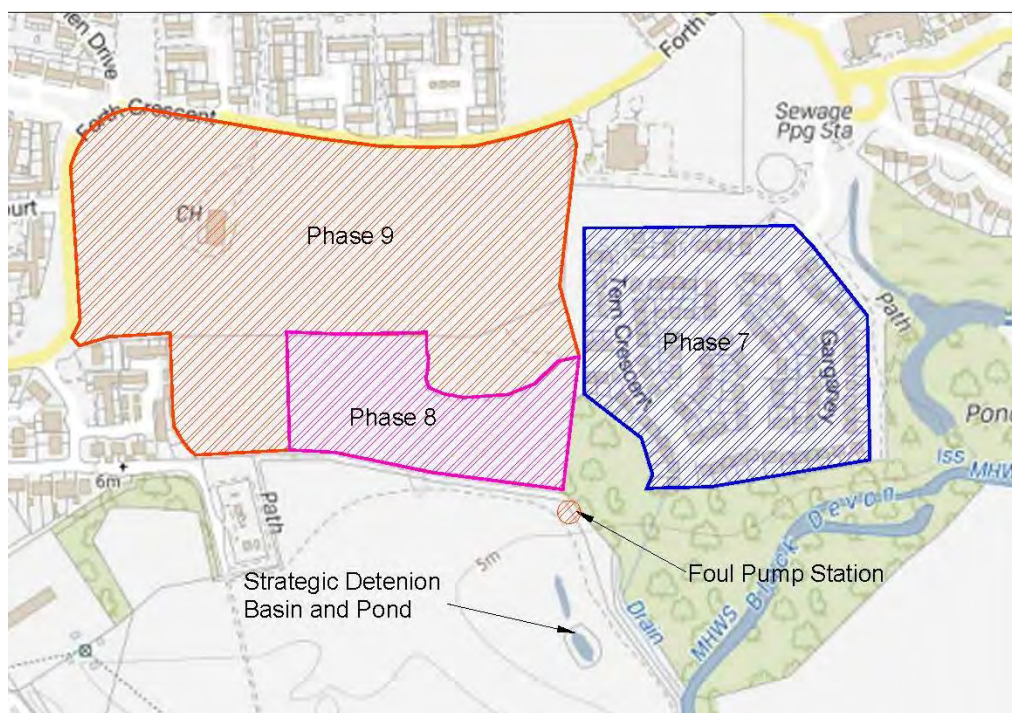


Figure 3-1 - Masterplan Overview

### Foul Drainage

- 3.8 As mentioned above the masterplan drainage was designed with a development content of 51 units and not the current content of 85 units. As such the pump station to the south east does not have capacity to accommodate the full phase 9 development and alternative solutions have been proposed.
- 3.9 24 units in the eastern extent of the site will drain in a northerly direction and discharge to the 450mm Scottish Water combined sewer in Forth Crescent. 39 units in the western extent of the site will drain westwards to the 450mm Scottish Water combined sewer to the west of the site beneath the proposed rugby pitches. The remaining 22 units will drain south into the Phase 8 drainage and to the foul pump station, well within the design allowance capacity of 51 units.
- 3.10 For a development content of 85 new residential units, it was calculated would generate an average foul flow of approximately 0.39l/s.
- 3.11 A Pre-Development Enquiry was sent to Scottish Water to allow them to assess whether there is sufficient capacity in the network to support the development. At the time of writing we are still awaiting a response from Scottish Water to the PDE application.

### Surface Water Drainage

- 3.12 As per the foul drainage the masterplan drainage had an allowance for phase 9, however this allowance was for 51 units and not the current 85 units.
- 3.13 The western extent of the development site, 39 units and associated roads, will



discharge surface water flows unrestricted to the surface water sewer in phase 8 and onto the strategic detention basin and pond before ultimate discharge to the Black Devon. This is in line with, or lower than, the masterplan drainage allowance for phase 9.

- 3.14 The eastern extent of the development site, remaining 46 units and associated roads, will drain to a detention basin within phase 9. The detention basin will have a discharge restriction of 5l/s. The discharge from the basin will then discharge to the outfall from the western extent of the site and drain through phase 8 to the detention basin and pond.
- 3.15 This strategy ensures that whilst the development content has changed the overall discharge from phase 9 is inline with the masterplan drainage works and has no impact on the overall discharge from the strategic SUDs basin and pond to the south east of the development. A copy of the drainage layout is attached in Appendix D.

#### Implementation of SUDS

- 3.16 In general terms, water environment quality is currently controlled by SEPA under the Water Environment and Water Services (Scotland) Act 2003 through implementation of The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended 2018). Under CAR a development such as that proposed at the site are considered to be a low risk activity and, as such, surface water discharges from these developments to the water environment are covered by the General Binding Rules (GBR) authorisation of the regulations. GBR activities taking place in accordance with these rules are considered as an authorisation and the operator is NOT required to contact SEPA with respect to surface water discharges.
- 3.17 The relevant GBRs relating to surface water discharges require the proposed development to be drained via SUDS to ensure that the surface water runoff from the development does not affect water quality in the receiving water environment.
- 3.18 CIRIA C753 - The SUDS Manual sets out the minimum water quality requirements for discharging to surface waters and outlines a simple index approach to ensure the chosen SUDS techniques are suitable for their intended use.
- 3.19 Each land use / impermeable area across the site has a different hazard level and associated pollutants. Each area must be assessed individually, and collectively, to ensure that the pollution mitigation indices are equal to or greater than the pollution hazard index.
- 3.20 Each anticipated land use across the site and associated pollution indices are outlined in the following table.

Residential Elements		Pollution Hazard Indices		
<i>Runoff Area/Land use</i>	<i>Hazard Level</i>	<i>Suspended Solids</i>	<i>Metals</i>	<i>Hydrocarbons</i>
Low traffic roads (e.g. residential roads and general access roads, <300 traffic movements/day)	Low	0.5	0.4	0.4
Individual Driveway	Low	0.5	0.4	0.4
Residential Parking	Low	0.5	0.4	0.4
Residential Roofs	Very Low	0.2	0.2	0.05

Table 3-1 - Pollution Hazard Indices

- 3.21 SEPA has introduced a Simple Index Approach Tool which confirms if the chosen SUDS techniques have sufficient pollution mitigation for the runoff area. A copy of the tool is attached in Appendix E to ensure sufficient treatment and pollutant removal is being provided by the chosen combination of SUDS techniques.
- 3.22 Treatment for surface water runoff from the development is being provided via the strategic SUDS detention basin and pond to the south east of the site. Enhanced treatment will be provided within the eastern extent of the development site as this will receive treatment via the detention basin on site before final treatment in the strategic basin and pond off site.

#### Rugby Pitches

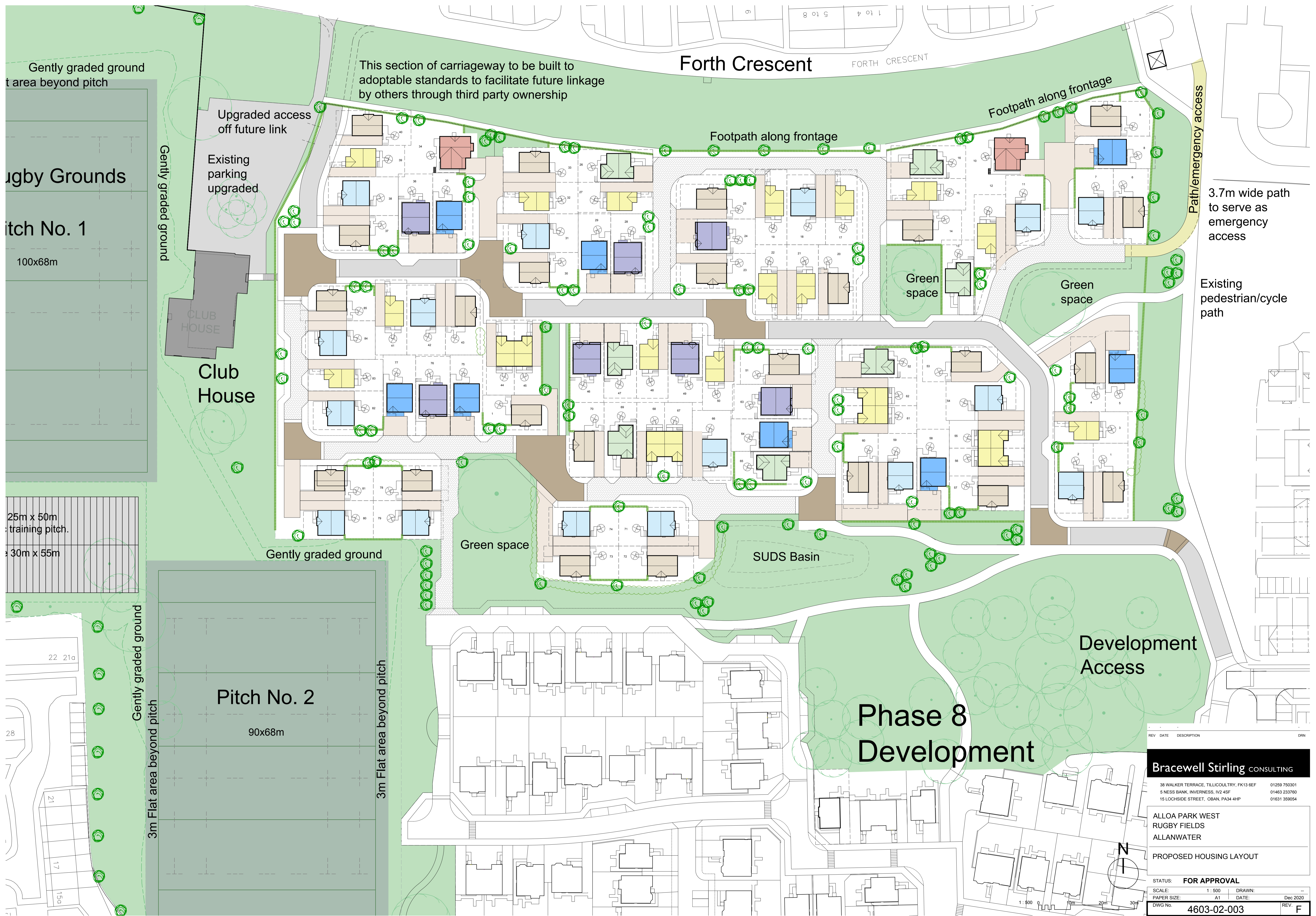
- 3.23 The relocated rugby pitches which will be placed in the western extent of the development site. the site will be reprofiled to provide a sufficient level playing surface.
- 3.24 Land drainage will be installed within the pitches in the form of lateral drains connected to a filter trench. Runoff from pitch 1 in the north east of the site will discharge to the culverted watercourse within this area of the site and runoff from pitch 2 will discharge to a flood conveyance swale to the south of the development site. A Copy of the rugby pitch drainage is attached in Appendix F.
- 3.25 Through implementation of the proposed drainage strategy the proposed site is being drained in line with the principles of the masterplan drainage. Foul flows will discharge to the Scottish Water network and surface water flows will discharge to the Balck Devon following appropriate treatment and attenuation. It is therefore considered that development will have a neutral or positive effect on the receiving watercourse.
- 3.26 SUDS are susceptible to damage during the construction phase activities due to

the high nutrient and sediment loads carried by the surface water runoff. Construction and site clearance should therefore be phased whenever possible to ensure minimum risk and temporary silt traps should be provided where necessary. If SUDS are used to treat construction site runoff, then they must be assessed and if necessary completely reinstated before being used for post development surface water treatment and attenuation.

## 4 Summary and Conclusions

- 4.1 In developing this Drainage Strategy for the proposed residential development located on land associated with Alloa Ruby Club to the south-east of Alloa, recommendations have focused on outlining a strategy to ensure that the development provides a suitable drainage network to meet the requirements of all relevant authorities.
- 4.2 It is proposed to drain foul flows generated by the development to Scottish Water network, this will be via 3 connections due to site restrictions and available capacity in a foul pump station installed during previous phases of development.
- 4.3 Surface water flows from the site will eventually discharge to the Black Devon watercourse to the south of the site, following sufficient treatment and attenuation from the on-site detention basin and detention pond to the south.
- 4.4 Surface water flows from the site will discharge to the Black Devon to the south east of the development site via strategic SUDS detention basin and pond installed to serve phase 7,8&9 of development. Development content of phase 9 has changed since the strategic pond and basin were designed and constructed, therefore additional on site attenuation is required for the eastern extent of phase 9, this is provided via a detention basin.
- 4.5 Treatment is provided via the strategic SUDS basin and pond. the eastern extent of the development site will receive enhanced treatment via the onsite detention basin.
- 4.6 It is the conclusion of this report that the proposed development can be drained in a sustainable manner to meet the requirements of Scottish Water, Clackmannanshire Council and the Scottish Environment Protection Agency and has been designed in accordance with the strategic drainage principles of the wider development.

Appendix A  
Proposed Development Masterplan



REV	DATE	DESCRIPTION	DRN

**Bracewell Stirling CONSULTING**

38 WALKER TERRACE, TILlicOUlTRY, FK13 6EF 01259 750301  
 5 NESS BANK, INVERNESS, IV2 4SF 01463 233760  
 15 LOCHSIDE STREET, OBAN, PA34 4HP 01631 359054

ALLOA PARK WEST  
 RUGBY FIELDS  
 ALLANWATER

PROPOSED HOUSING LAYOUT

STATUS: **FOR APPROVAL**

SCALE: 1 : 500 DRAWN: --  
 PAPER SIZE: A1 DATE: Dec 2020  
 DWG No. 4603-02-003 REV. F



**Bracewell Stirling CONSULTING**

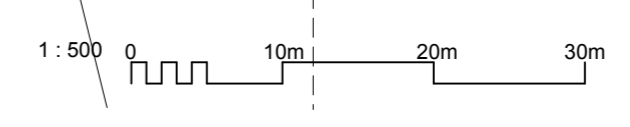
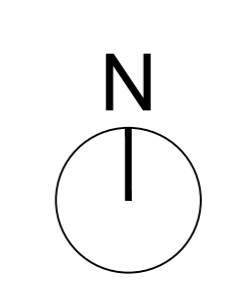
38 WALKER TERRACE, TILLCOUNTRY, FK13 6EF 01259 750301  
 5 NESS BANK, INVERNESS, IV2 4SF 01463 233760  
 15 LOCHSIDE STREET, OBAN, PA34 4HP 01631 359054

ALLOA PARK WEST  
 RUGBY FIELDS  
 ALLANWATER

PROPOSED NEW RUGBY FACILITIES

STATUS: **FOR APPROVAL**

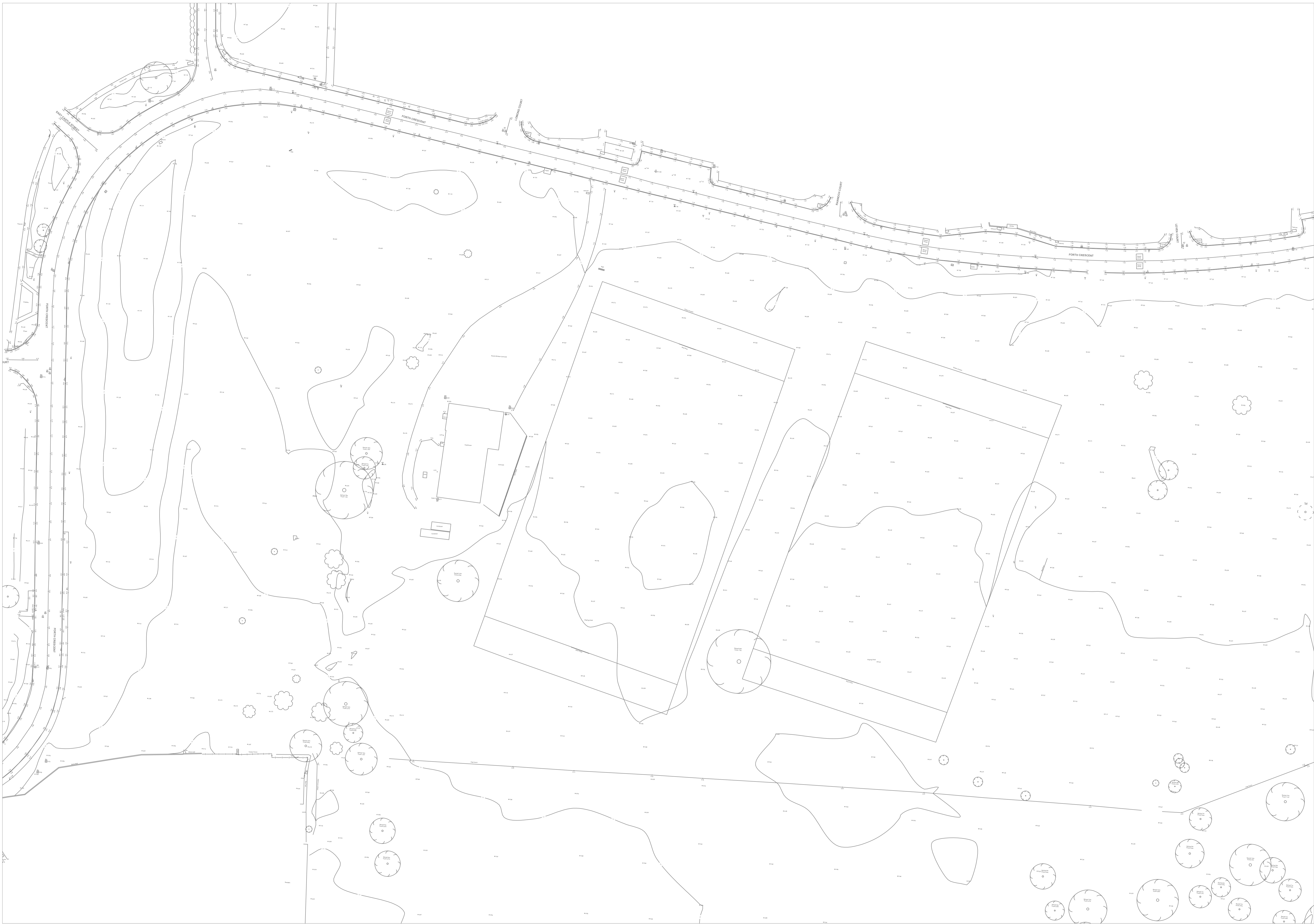
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 PAPER SIZE: A1 DATE: Dec 2020  
 DWG No. 4603-02-002 REV. D



GVC

Appendix B  
Topographic Survey





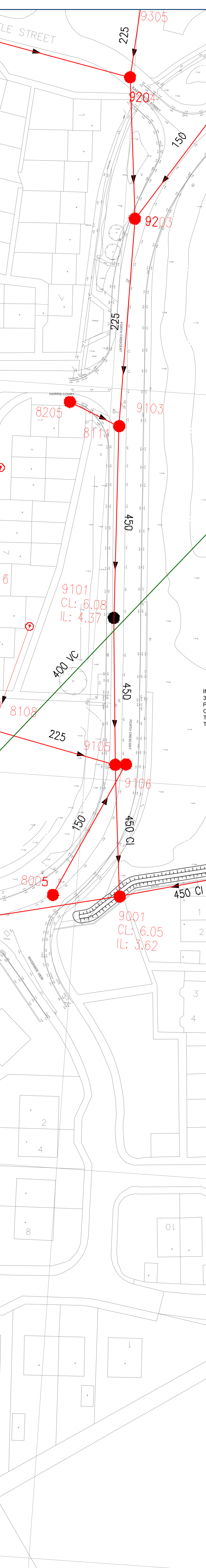
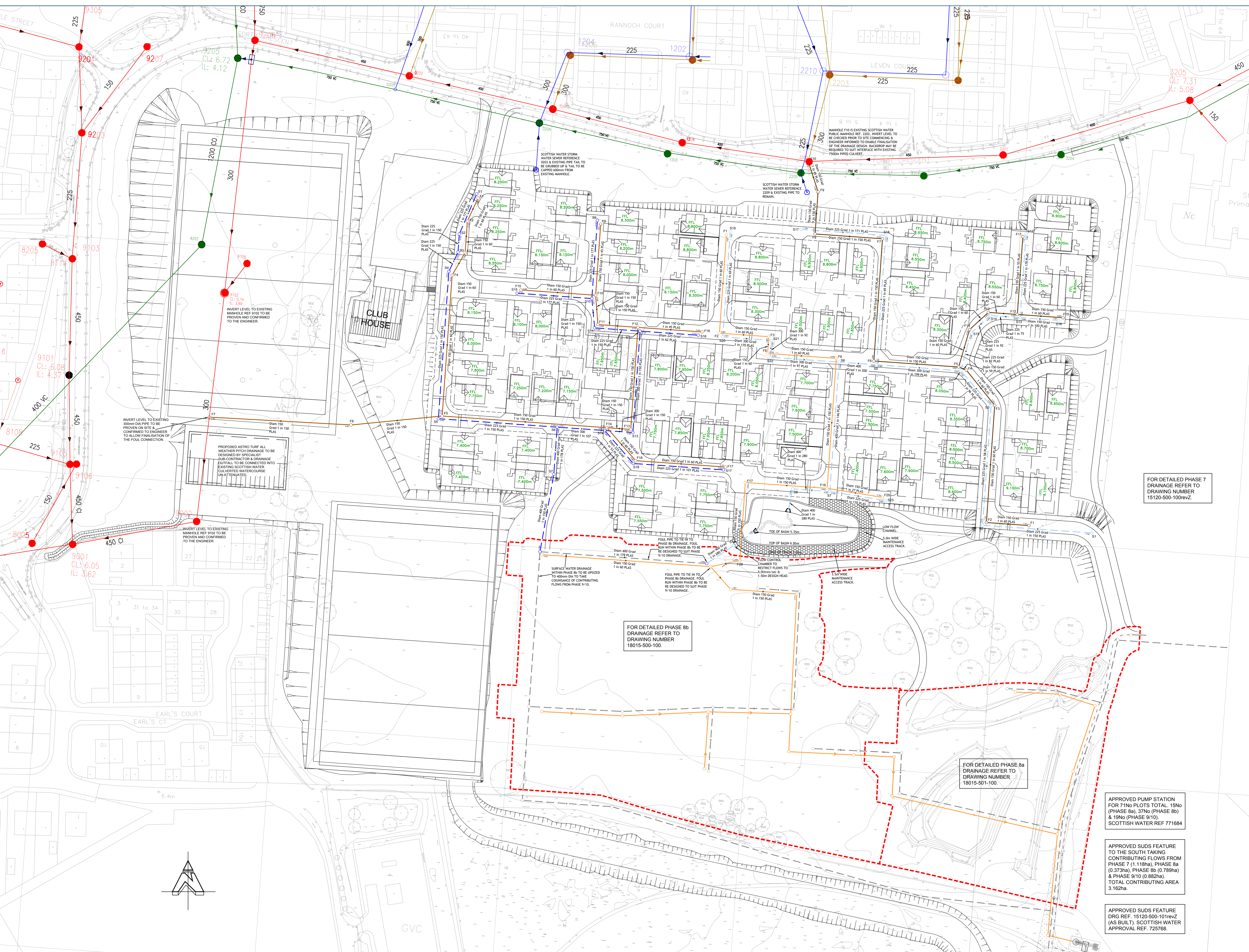
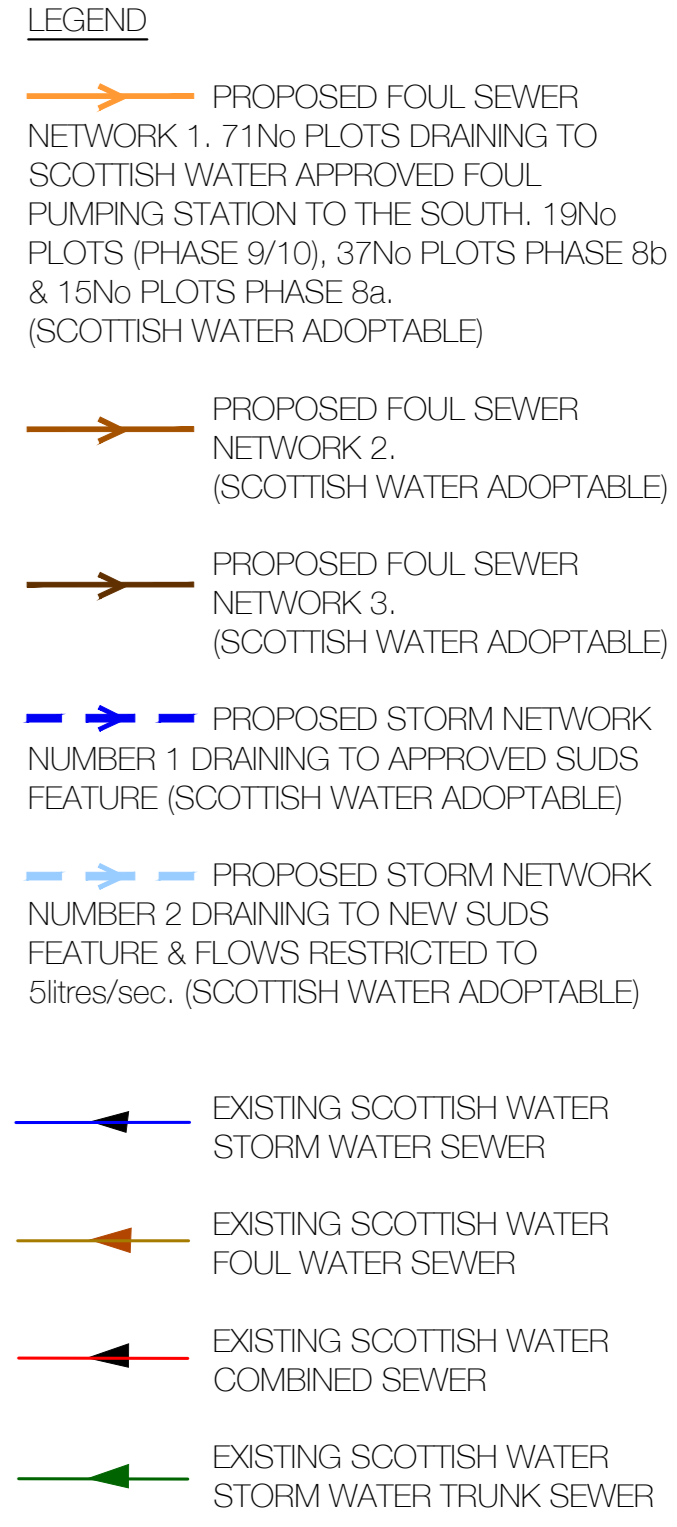
# Appendix C

## Scottish Water Asset Plans



Appendix D  
Proposed Drainage Layout

- Notes:
1. ALL CONSTRUCTION DETAILS TO COMPLY WITH CLACKMANNANSHIRE COUNCIL, ROADS DEVELOPMENT GUIDE AND THE DESIGN MANUAL FOR ROADS AND BRIDGES.
  2. THE SPECIFICATION FOR THIS PROJECT IS THE SPECIFICATION FOR HIGHWAY WORKS.
  3. ALL DRAINAGE TO COMPLY WITH 'SEWERS FOR SCOTLAND 3'
  4. ALL STORM AND FOUL SEWERS TO BE JETTED ON COMPLETION AND CCTV INSPECTION CARRIED OUT.
  5. ALL GULLEY TAILS TO BE 150mm DIAMETER.
  6. ALL DISCONNECTOR PIPEWORK TO BE 150 DIA LAID AT A MINIMUM GRADE OF 1 IN 60.
  7. DISCONNECTOR MANHOLE SPECIFICATION TO BE AGREED WITH BUILDING CONTROL, SCOTTISH WATER AND NHCBC PRIOR TO WORKS COMMENCEMENT.



PROPOSED ASTRO TURF ALL WEATHER PITCH DRAINAGE TO BE DESIGNED BY SPECIALIST SUB-CONTRACTOR & DRAINAGE OUTFALL TO BE CONNECTED INTO EXISTING SCOTTISH WATER COLLECTED WATERCOURSE UNATTENUATED

INVERT LEVEL TO EXISTING MANHOLE REF 9102 TO BE PROVIDED AND CONFIRMED TO THE ENGINEER.

INVERT LEVEL TO EXISTING MANHOLE REF 9102 TO BE PROVIDED AND CONFIRMED TO THE ENGINEER.

INVERT LEVEL TO EXISTING MANHOLE REF 9102 TO BE PROVIDED AND CONFIRMED TO THE ENGINEER.

FOUL PIPE TO TIE IN TO PHASE 8a DRAINAGE. FOUL RUN WITHIN PHASE 8a TO BE RE-DESIGNED TO SUIT PHASE 9/10 DRAINAGE.

FOUL PIPE TO TIE IN TO PHASE 8b DRAINAGE. FOUL RUN WITHIN PHASE 8b TO BE RE-DESIGNED TO SUIT PHASE 9/10 DRAINAGE.

FOUL PIPE TO TIE IN TO PHASE 8c DRAINAGE. FOUL RUN WITHIN PHASE 8c TO BE RE-DESIGNED TO SUIT PHASE 9/10 DRAINAGE.

FOUL PIPE TO TIE IN TO PHASE 8d DRAINAGE. FOUL RUN WITHIN PHASE 8d TO BE RE-DESIGNED TO SUIT PHASE 9/10 DRAINAGE.

FOUL PIPE TO TIE IN TO PHASE 8e DRAINAGE. FOUL RUN WITHIN PHASE 8e TO BE RE-DESIGNED TO SUIT PHASE 9/10 DRAINAGE.

FOUL PIPE TO TIE IN TO PHASE 8f DRAINAGE. FOUL RUN WITHIN PHASE 8f TO BE RE-DESIGNED TO SUIT PHASE 9/10 DRAINAGE.

FOR DETAILED PHASE 7 DRAINAGE REFER TO DRAWING NUMBER 15120-500-100REVZ.

FOR DETAILED PHASE 8a DRAINAGE REFER TO DRAWING NUMBER 18015-500-100.

FOR DETAILED PHASE 8a DRAINAGE REFER TO DRAWING NUMBER 18015-501-100.

APPROVED PUMP STATION FOR 71No PLOTS TOTAL. 15No (PHASE 8a), 37No (PHASE 8b) & 19No (PHASE 9/10). SCOTTISH WATER REF 771684

APPROVED SUDS FEATURE TO THE SOUTH TAKING CONTRIBUTING FLOWS FROM PHASE 7 (1.118ha), PHASE 8a (0.373ha), PHASE 8b (0.789ha) & PHASE 9/10 (0.882ha). TOTAL CONTRIBUTING AREA 3.162ha.

APPROVED SUDS FEATURE DRG REF. 15120-500-101REVZ (AS BUILT). SCOTTISH WATER APPROVAL REF. 725768.

Rev:	By:	Checked:	Date:
Client:	ALLANWATER DEVELOPMENTS LTD		
Project:	ALLOA PARK, PHASE 9 & 10		
Drawing Title:	PRELIMINARY DRAINAGE LAYOUT		
Drawn:	S.P.	Checked:	P.R.
Date:	10.08.20	Date:	10.08.20
Scale:	1:500	Drawn By:	@AO
Drawn By:	PRELIMINARY	Date:	2013-500-100
3 Glenfield Road, Keweenaw, East Kilbride G75 0RA. t: 01355 264466 f: 01355 221991 e: enquiries@dba.co.uk www.dougalballie.com		Dougal Ballie Associates	
		<b>DBA</b>	

## Appendix E

### SIA Tool

## SIMPLE INDEX APPROACH: TOOL



HRW shall not be liable for any direct or indirect damage claim, loss, cost, expense or liability howsoever arising out of the use or impossibility to use the tools, even when HRW has been informed of the possibility of the same. The user hereby indemnifies HRW from and against any damage claim, loss, expense or liability resulting from any action taken against HRW that is related in any way to the use of the tool or any reliance made in respect of the output of such use by any person whatsoever. HRW does not guarantee that the tool's functions meet the requirements of any person, nor that the tool is free from errors.

1. The steps set out in the tool should be applied for each inflow or 'runoff area' (ie each impermeable surface area separately discharging to a SuDS component).
2. The supporting 'Design Conditions' stated by the tool must be fully considered and implemented in all cases.
3. The process that is automated in this tool is described in the SuDS Manual, Chapter 26 (Section 26.7)
3. Relevant design examples are included in the SuDS Manual Appendix C.
4. Each of the steps below are part of the process set out in the flowchart on Sheet 3.
5. Sheet 4 summarises the selections made below and indicates the acceptability of the proposed SuDS components.
6. Interception should be delivered for all upstream impermeable areas as part of the strategy for water quantity and quality control for the site. This is required in order to deliver both of the water quality criteria set out in Chapter 4 of the SuDS Manual

  DROP DOWN LIST                      RELEVANT INPUTS NEED TO BE SELECTED FROM THESE LISTS, FOR EACH STEP

  USER ENTRY                              USER ENTRY CELLS ARE ONLY REQUIRED WHERE INDICATED BY THE TOOL

### STEP 1: Determine the Pollution Hazard Index for the runoff area discharging to the proposed SuDS scheme

This step requires the user to select the appropriate land use type for the area from which the runoff is occurring

If the land use varies across the 'runoff area', either:

- use the land use type with the highest Pollution Hazard Index
- apply the approach for each of the land use types to determine whether the proposed SuDS design is sufficient for all. If it is not, consider collecting more hazardous runoff separately and providing additional treatment.

If the generic land use types suggested are not applicable, select 'Other' and enter a description of the land use of the runoff area and agreed user defined indices in the row below the drop down lists.

Runoff Area Land Use Description	Hazard Level	Pollution Hazard Indices			DESIGN CONDITIONS	
		Total Suspended Solids	Metals	Hydrocarbons	1	2
Roads (excluding low traffic roads, highly frequented lorry approaches to industrial estates, trunk roads/motorways)	Medium	0.7	0.6	0.7		
<span style="border: 1px solid green; padding: 2px;"> </span>		<span style="border: 1px solid green; padding: 2px;"> </span>	<span style="border: 1px solid green; padding: 2px;"> </span>	<span style="border: 1px solid green; padding: 2px;"> </span>		
<b>Landuse Pollution Hazard Index</b>	<b>Medium</b>	<b>0.7</b>	<b>0.6</b>	<b>0.7</b>		

Select land use type from the drop down list (or 'Other' if none applicable):

If the generic land use types in the drop down list above are not applicable, select 'Other' and enter a description of the land use of the runoff area and agreed user defined indices in this row:

### STEP 2A: Determine the Pollution Mitigation Index for the proposed SuDS components

This step requires the user to select the proposed SuDS components that will be used to treat runoff - before it is discharged to a receiving surface waterbody or downstream infiltration component

If the runoff is discharged directly to an infiltration component, without upstream treatment, select 'None' for each of the 3 SuDS components and move to Step 2B

This step should be applied to evaluate the water quality protection provided by proposed SuDS components for discharges to receiving surface waters or downstream infiltration components (note: in England and Wales this will include components that allow any amount of infiltration, however small, even where infiltration is not specifically accounted for in the design).

If you have fewer than 3 components, select 'None' for the components that are not required

If the proposed component is bespoke and/or a proprietary treatment product and not generically described by the suggested components, then 'Proprietary treatment system' or 'User defined indices' should be selected and a description of the component and agreed user defined indices should be entered in the rows below the drop down lists

	SuDS Component Description	Pollution Mitigation Indices		
		Total Suspended Solids	Metals	Hydrocarbons
Select SuDS Component 1 (i.e. the upstream SuDS component) from the drop down list:	Detention basin	0.5	0.5	0.6
Select SuDS Component 2 (i.e. the second SuDS component in a series) from the drop down list:	Pond or wetland	0.7	0.7	0.5
Select SuDS Component 3 (i.e. the third SuDS component in a series) from the drop down list:	None	0	0	0
If the proposed SuDS components are bespoke/proprietary and/or the generic indices above are not considered appropriate, select 'Proprietary treatment system' or 'User defined indices' and enter component descriptions and agreed user defined indices in these rows:				
<b>Aggregated Surface Water Pollution Mitigation Index</b>		<b>0.85</b>	<b>0.85</b>	<b>0.85</b>

**DESIGN CONDITIONS**

1

2

3

SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B

Detention basins should be designed to ensure the effective retention and management of sediment, such that the sediment will not be re-suspended and washed out in subsequent events

SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B

Ponds/wetlands should be preceded by an upstream component(s) that trap(s) silt, or designed specifically to retain sediment in a separate zone, easily accessible for maintenance, such that the sediment will not be re-suspended in subsequent events

Note: If the total aggregated mitigation index is > 1 (which is not a realistic outcome), then the outcome is fixed at ">0.95". In this scenario, the proposed components are likely to have a very high mitigation potential for reducing pollutant levels in the runoff and should be sufficient for any proposed land use (note: where risk assessment is required, this outcome would need more detailed verification).

Is the runoff now discharged to an infiltration component?

Yes ? [Go to Step 2B](#)  
No ? [Go to Step 2C](#)

**STEP 2B: Determine the Pollution Mitigation Index for the proposed Groundwater Protection**

This step requires the user to select the type of groundwater protection that is either part of the SuDS component or that lies between the component and the groundwater

This step should be applied where a SuDS component is specifically designed to infiltrate runoff (note: in England and Wales this will include components that allow any amount of infiltration, however small, even where infiltration is not specifically accounted for in the design).

'Groundwater protection' describes the proposed depth of soil or other material through which runoff will flow between the runoff surface and the underlying groundwater.

Where the discharge is to surface waters and risks to groundwater need not be considered, select 'None'

If the proposed groundwater protection is bespoke and/or a proprietary product and not generically described by the suggested measures, then a description of the protection and agreed user defined indices should be entered in the row below the drop down list

	Pollution Mitigation Indices		
	Total Suspended Solids	Metals	Hydrocarbons

**DESIGN CONDITIONS**

1

2

3



Select type of groundwater protection from the drop down list:



Pervious pavement underlain by 300 mm minimum depth of soils with good contamination attenuation potential

If the proposed groundwater protection is bespoke/proprietary and/or the generic indices above are not considered appropriate, select 'Proprietary product' or 'User defined indices' and enter a description of the protection and agreed user defined indices in this row:

**Groundwater Protection Pollution Mitigation Index**

0.7      0.6      0.7

**0.7      0.6      0.7**

All designs must include a minimum of 1 m unsaturated depth of subsoil or aquifer material between the infiltration surface and the maximum likely groundwater level. Infiltration components should always be preceded by upstream component(s) that trap(s) silt, or designed specifically to retain sediment in a separate lined zone, easily accessible for maintenance, such that the sediment will not be re-suspended in subsequent events

The permeable pavement must include a suitable filtration layer provides treatment and must include a geotextile at the base separating the foundation from the sub-grade. The underlying soils must provide good contaminant attenuation potential (eg as recommended in Sniffer 2008 (a) and (b) / Scott Wilson (2010) or other appropriate guidance). Alternative depth and soil combinations must provide equivalent protection to the underlying groundwater

**STEP 2C: Determine the Combined Pollution Mitigation Indices for the Runoff Area**

This is an automatic step which combines the proposed SuDS Pollution Mitigation Indices with any Groundwater Protection Pollution Mitigation Indices

*Combined Pollution Mitigation Indices*  
Total Suspended Solids      Metals      Hydrocarbons

**Combined Pollution Mitigation Indices for the Runoff Area      >0.95      >0.95      >0.95**

Note: If the total aggregated mitigation index is > 1 (which is not a realistic outcome), then the outcome is fixed at ">0.95". In this scenario, the proposed components are likely to have a very high mitigation potential for reducing pollutant levels in the runoff and should be sufficient for any proposed land use (note: where risk assessment is required, this outcome would need more detailed verification).

**STEP 2D: Determine Sufficiency of Pollution Mitigation Indices for Selected SuDS Components**

This is an automatic step which compares the Combined Pollution Mitigation Indices with the Land Use Hazard Indices, to determine whether the proposed components are sufficient to manage each pollutant category type

When the combined mitigation index exceeds the land use pollution hazard index, then the proposed components are considered sufficient in providing pollution risk mitigation.

**DESIGN CONDITIONS**

In England and Wales, where the discharge is to protected surface waters or groundwater, an additional treatment component (ie over and above that required for standard discharges), or other equivalent protection, is required that provides environmental protection in the event of an unexpected pollution event or poor system performance. Protected surface waters are those designated for drinking water abstraction. In England and Wales, protected groundwater resources are defined as Source Protection Zone 1. In Northern Ireland, a more precautionary approach may be required and this should be checked with the environmental regulator on a site by site basis.

*Sufficiency of Pollution Mitigation Indices*  
Total Suspended Solids      Metals      Hydrocarbons

**Sufficient      Sufficient      Sufficient**

1  
Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England

Note: In order to meet both Water Quality criteria set out in the SuDS Manual (Chapter 4), interception should be delivered for all impermeable areas wherever possible. Interception delivery and treatment may be met by the same components, but interception requires separate evaluation.

## Appendix F

### Rugby Pitches Drainage Layout

