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FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY REPORT

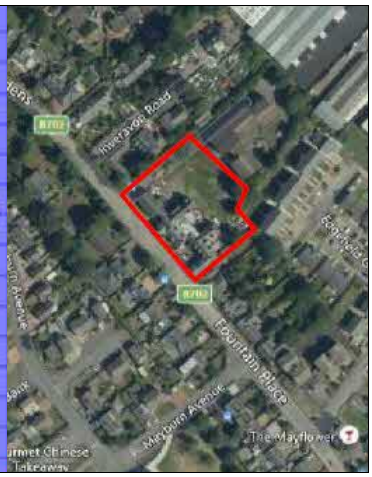
IN SUPPORT OF DETAILED PLANNING PERMISSION

AT

PROPOSED CARE HOME, HAWTHORNE GARDENS, LOANHEAD

FOR

MANSFIELD CARE LTD



Project ID: J5416
Dated: May 2023
Version 2

MANSFIELD CARE LTD

PROPOSED CARE HOME, HAWTHORNE GARDENS, LOANHEAD

FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY REPORT

Report Reference: J5416 - Proposed Care Home, Hawthorne Gardens, Loanhead					
Issue	Date	Reason	Prepared By	Signed By	Approved By
V1	04/23	Original	Dave Purves	[redacted]	[redacted]
V1	05/23	Revision of nationa Guidance	Dave Purves BSc (Hons), CEng, MICE Director	Gregor King EUR ING, BEng (Hons), CEng, MIStructE, MICE Associate Director	Craig Stevenson CEng MIStructE Managing Director

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CONTENTS

1.0 INTRODUCTION

Bayne Stevenson Associates Limited were appointed by Mansfield Care Ltd (The Client) to prepare a Drainage Strategy to support a Planning Application to Midlothian Council in respect of a new Care Home at Hawthorne Gardens, Loanhead. Refer to Appendix A for a site location plan.

It is proposed to construct a 50-bed care home with associated infrastructure.

This report reviews the flood risk to the site and describes both the treatment and attenuation strategies to be adopted for the surface water drainage solution to the site. In addition, the intended strategy is defined in relation to the foul water drainage.

2.0 CURRENT GUIDANCE DOCUMENTS AND POLICY REQUIREMENTS

The primary framework documents for consideration of surface water treatment and discharge are as follows:

SEPA Document - The Water Environment (Controlled Activities) (Scotland) Regulations 2011, Version 7.4 dated July 2016.
SEPA Document – Water Use, Regulatory Method (WAT-RM—08) Sustainable Urban Drainage Systems (SUDS or SUD Systems), Version v6.3 dated March 2019.
CIRIA document C753 – SUDS manual dated 2015
Scottish Water – Sewers for Scotland 4
National Planning Framework 4
Midlothian Council – Flood Prevention Guidelines

These documents, in summary, note and advise as follows:

<u>CAR Regulations 2011</u>
Provides practical advice on the water environment and details which activities, in relation to the water environment, are regulated by SEPA and what level of authorisation for each activity is necessary.

The differing levels of SEPA authorisations for activities are classed as General Binding Rules, Registration or simple / complex licence.

In relation to surface water discharges section 3.4 'Pollution Control, General Binding Rules' applies and states:

'CAR contains General Binding Rules (GBR's) for specific low risk activities. When an activity complies with the relevant GBR, there is no need to contact SEPA or apply for formal authorisation'. Furthermore, GBR10 and GBR11 are the two general binding rules relevant to surface water treatment and discharge and these are detailed below:

GBR10: Discharge of surface water run-off from a surface water drainage system to the water environment from construction sites, buildings, roads, yards and any other built-up areas.

Rules:

a) If the surface water run-off is from areas constructed after 1 April 2007, the site must be drained by a Sustainable Urban Drainage System (SUDS). If the surface water run-off is from a construction site operated after 1 April 2007, the site must be drained by a SUD system or equivalent. The only exceptions are if the run-off is from a single dwelling and its curtilage, or if the discharge is to coastal water.

b) All reasonable steps must be taken to ensure that the discharge will not result in pollution of the water environment.

c) The discharge must not contain any trade effluent or sewage and must not result in visible discolouration, iridescence, foaming or sewage fungus in the water environment.

d) The discharge must not result in the destabilisation of the banks or bed of the receiving surface water.

e) The discharge must not contain any water run-off from any of the following areas constructed after 1 April 2007:
   - Fuel delivery areas and areas where vehicles, plant and equipment are refuelled;
   - Vehicle loading or unloading bays where potentially polluting matter is handled;
   - Oil and chemical storage, handling and delivery areas.

f) All treatment systems (including oil interceptors, silt traps and SUDS) must be maintained in a good state of repair.

g) All reasonable steps must be taken to ensure that any matter liable to block, obstruct, or otherwise impair the ability of the SUDS is prevented from entering the system.

h) The construction and maintenance of the outfall must not result in pollution of the water environment.

GBR11: Discharge into a surface water drainage system.

Rules:

a) Oil, paint thinners, pesticides, detergents, disinfectants or other pollutants must not be disposed of into a surface water drainage system or onto any surface which drains into it.

b) Any matter liable to block, obstruct or otherwise impair the ability of the surface water drainage system must not be disposed of into the system or onto a surface that drains into the system.

c) Sewage or trade effluent must not be discharged into any surface water drainage system.

d) On a construction site, the area of soil draining into a surface water drainage system must be minimised. The period of time within which this area drains into the system must also be minimised.

In summary CAR advises, under Section 1, point 2 – 'If your activity falls under a general binding rule (GBR) you do not need to apply to SEPA for an authorisation, though you must ensure you comply with the conditions of the GBR. '

Regulatory Method (WAT-RM-08)

Provides guidance on the regulation of surface water discharges from built developments including construction sites, buildings, roads and yards. It includes the appropriate types of SUDS systems for developments.

It notes:

Within section 2 'Adoption' that:

> Maintenance of SUDS within the boundaries or curtilage of a private property is the responsibility of the land owner or occupier.
> SEPA's preference is for SUDS constructed outwith the curtilage of private properties be adopted by Scottish Water, the local authority or public body. It indicates that Sewers for Scotland contains Scottish Water's construction standards for SUDS and that if SUDS are constructed to these standards Scottish Water has a duty (at the developer's discretion) to adopt the SUDS and thereby become responsible for it.
> The SUDS for roads guidance documents provides a collaborative framework for a more integrated drainage approach.

Within section 3.1 'Authorisation under CAR' that the following proposed developments can be authorised by GBR 10:

- Housing Developments up to 60Ha.
- Retail (shops) or business parks (offices) with less than 1000 houses/car parking spaces.

Within section 3.2 'SUDS Requirements' it notes SUDS requirements for a particular land use (e.g., residential, industrial estates) should be determined by referring to the SUDS manual (CIRIA C753).

Section 3.2.2 'Treatment of runoff' advises that the SUDS manual sets out the water quality management approach for differing land uses and indicates 'for most developments this can be achieved by following the Simple Index Approach as described in section 26.7.1 of the CIRIA SUDS manual'. It also advises that a Simple Index Approach tool is available to help determine whether the proposed SUDS are in line with the Simple Index Approach and acceptable. This is further detailed within the relevant section of this report.

<u>SUDS Manual</u>

This details potential methods of SUDS treatment and provides guidance on design of same. Within chapter 1 it details types of SUDS components, as indicated within below table.

Component type	Description
Rainwater harvesting systems	Rainwater is collected from the roof of a building or from other paved surfaces in an over-ground or underground tank for use on site. Depending on its intended use, the system may include treatment elements. The system should include specific storage provision if it is to be used to manage runoff to a design standard.
Green roofs	A planted soil layer is constructed on the roof of a building to create a living surface. Water is stored in the soil layer and absorbed by vegetation. Blue roofs store water at roof level, without the use of vegetation.
Infiltration systems	These systems collect and store runoff allowing it to infiltrate into the ground. Overlying vegetation and underlying unsaturated soils can offer protection to groundwater from pollution risks.
Proprietary treatment systems	These subsurface and surface structures are designed to provide treatment of water through the removal of contaminants.
Filter strips	Runoff from an impermeable area is allowed to flow across a grassed or otherwise densely planted area to promote sedimentation and filtration.

Filter drains	Runoff is temporarily stored below the surface in a shallow trench filled with stone/gravel, providing attenuation, conveyance and treatment (via filtration).
Swales	A vegetated channel is used to convey and treat runoff (via filtration). These can be "wet", where water is designed to remain permanently at the base of the swale, or "dry" where water is only present in the channel after rainfall events. It can be lined, or unlined to allow infiltration.
Bioretention systems	A shallow landscaped depression allows runoff to pond temporarily on the surface, before filtering through vegetation and underlying soils prior to collection or infiltration. In its simplest form it is often referred to as a rain garden. Engineered soils (gravel and sand layers) and enhanced vegetation can be used to improve treatment performance.
Trees	Trees can be planted within a range of infiltration SuDS components to improve their performance, as root growth and decomposition increase soil infiltration capacity. Alternatively, they can be used as standalone features within soilfilled tree pits, tree planters or structural soils, collecting and storing runoff and providing treatment (via filtration and phytoremediation).
Pervious pavements	Runoff is allowed to soak through structural paving. This can be paving blocks with gaps between solid blocks, or porous paving where water filters through the block itself. Water can be stored in the sub-base and potentially allowed to infiltrate into the ground.
Attenuation storage tanks	Large, below-ground voided spaces can be used to temporarily store runoff before infiltration, controlled release or use. The storage structure is often constructed using geocellular or other modular storage systems, concrete tanks or oversized pipes.
Detention basins	During a rainfall event, runoff drains to a landscaped depression with an outlet that restricts flows, so that the basin fills and provides attenuation. Generally, basins are dry, except during and immediately following the rainfall event. If vegetated, runoff will be treated as it is conveyed and filtered across the base of the basin.
Ponds and wetlands	Features with a permanent pool of water can be used to provide both attenuation and treatment of runoff, where outflows are controlled, and water levels are allowed to increase following rainfall. They can support emergent and submerged vegetation along their shoreline and in shallow, marshy zones, which enhances treatment processes and biodiversity.

Sewers for Scotland 4

Design guidance on sewers and SUDS infrastructure that would permit prospective adoption of networks by Scottish Water.

National Planning Framework 4

Sets out the Scottish Governments planning policy in relation to flooding on new development. The policy highlights:

- That all developers and authorities should give consideration to avoiding development in areas at flood risk as a first principle

- Plans should take into account the probability of flooding from all sources and make use of relevant flood risk and river basin management plans for the area. A precautionary approach should be taken, regarding the calculated probability of flooding as a best estimate, not a precise forecast.

Any development proposed in an area deemed to be at risk of flooding or in a flood risk area will only be supported in the following circumstances:

I. Essential infrastructure where the location is required for operational reasons.
II. Water compatible uses.
III. Redevelopment of an existing building or site for an equal or less vulnerable use.
IV. Redevelopment of previously used sites in built up areas where the LDP has identified a need to bring these into positive use and where proposals demonstrate that long term safety and resilience can be secured in accordance with relevant SEPA advice.

Additionally, for development proposals meeting criteria part IV, where flood risk is managed at the site rather than avoided these will also require:

- the first occupied/utilised floor, and the underside of the development if relevant, to be above the flood risk level and have an additional allowance for freeboard; and
- that the proposal does not create an island of development and that safe access/egress can be achieved.

Small scale extensions and alterations to existing buildings will only be supported where they will not significantly increase flood risk.

Development proposals will:

not increase the risk of surface water flooding to others, or itself be at risk.

manage all rain and surface water through sustainable urban drainage systems (SUDS), which should form part of and integrate with proposed and existing blue green infrastructure. All proposals should presume no surface water connection to the combined sewer.

seek to minimise the area of impermeable surface.

Development proposals will be supported if they can be connected to the public water mains. If connection is not feasible, the applicant will need to demonstrate that water for drinking water purposes will be sourced from a sustainable water source that is resilient to periods of water scarcity.

Development proposals which create, expand or enhance opportunities for natural flood risk management, including blue and green infrastructure, will be supported.

The protection offered by an existing formal flood protection scheme or one under construction can be taken into account when determining flood risk.

In such cases, it will be demonstrated by the applicant that:

- All risks of flooding are understood and addressed.
- There is no reduction in floodplain capacity, increased risk for others, or a need for future flood protection schemes.
- The development remains safe and operational during floods.
- Flood resistant and resilient materials and construction methods are used; and
- Future adaptations can be made to accommodate the effects of climate change.

Local Authority Guidance and Flood Risk Requirements

The relevant guidance from the local authority Flood Prevention Officer indicates:

The surface water sewers and attenuation should be designed to accommodate a 1 in 30 year return period including 40% climate change without flooding.

Checks should be made to the 1 in 100 year and 1 in 200 year return period including 40% climate change and in the result of any flooding storage should be provided for the flooded volume within the site.

3.0 SITE DETAILS

The development proposal consists of a 50-bed care home with associated infrastructure on a brownfield site. The site has a fall of circa 2.0m from south to north and is bounded by a road to the south, Trust Housing Association to the north and residential houses to the east and west.

A location plan is shown within Appendix A.

The intended discharge location for surface water is to the private storm water sewer at the north of the main site area, at an attenuated flow and after an appropriate SUDS treatment train.

A copy of the available Scottish Water network plan is attached, for reference purposes, within Appendix B.

The overall site area is noted as 3912 m^2 equating to 0.39 Ha.

The area of impermeable surfacing within the site area is noted as 2500 m^2 equating to 0.25 Ha.

Hydrological Characteristics of the site, taken from the Flood Estimation Handbook, are based on point descriptor 328872, 662571.

SUDS selection for the site has been carried out in accordance with the options available within the SUDS Component table detailed within Section 2 of this report, and as taken from CIRIA document C753 – SUDS manual dated 2015. These include:

Pervious Pavement

These design criteria assessed for the site will be adopted and utilised for detail design.

4.0 FLOOD RISK

Reference to the SEPA flood map indicates that the site and surrounding areas are not at risk of pluvial flooding or fluvial flooding for a 1 in 200 year storm return period.

A copy of the SEPA flood map is attached in Appendix C.

5.0 HYDRAULIC DESIGN CRITERIA

The surface water drainage system including attenuation is to be designed to accommodate both SEPA and Midlothian Council Flood Prevention Officer's requirements.

The system is to be designed to accommodate the 1 in 30 year plus 40% climate design critical storm event for the site.
In addition to the above, flood water from storms up to, and including 200-year storms plus 40% climate change are to be contained within the site, with localised above ground flooding accepted.

The flood routing/ponding for storm events of 1 in 100 years plus 40% and 1 in 200 years plus 40% for climate change are to be examined for both predevelopment and post development scenarios, to demonstrate no detrimental impacts to surrounding areas will occur.

The pre-development flood routing drawings are attached within Appendix D, the reader is also referred to the relevant post-development flood routing submitted with the application.

The permissible discharge has been agreed with the adjacent landowner to discharge to their private surface water network (proposed for future Scottish Water adoption) at a rate of 2.5l/s. The private surface water network then connects to the existing Scottish Water surface water sewer.

Scottish Water have confirmed in their PDE response that they currently have capacity for this discharge.

A copy of the Scottish Water PDE response is enclosed within Appendix G.

6.0 SUDS DESIGN CRITERIA

As detailed within section 2 of this report the SUDS strategy should be in accordance with WAT-RM-08 which advocates use of the Simple Index Approach (SIA) system. Within the SIA there is a requirement to define the 'Land Use Characterisation' and the table below notes the definitions of land use (from the SIA) along with their relevance to this development.

Land Use	Type	Pollution hazard level	Relevant to development
Roof	Residential	Very low	X
	Commercial / Industrial (inert materials)	Very low	✓
	Commercial / Industrial (low potential for metal leaching)	low	X
	Commercial / Industrial (medium potential for metal leaching) inert materials)	medium	X
	Commercial / Industrial (high potential for metal leaching) inert materials)	high	X
Parking	Individual Driveway	low	X
	Residential Parking	low	X
	Non-Residential Parking with infrequent change (e.g., schools, offices, <300 traffic movements a day)	low	✓
	Non-Residential Parking with frequent change (e.g., hospitals, retail)	medium	X
Yards / Depots	Standard commercial yard or delivery area	medium	X
	Haulage yard	high	X
	Lorry Park	high	X
	Waste handling/management/distribution site	high	X

	Site where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured	high	X
	Other industrial site area	high	X
Roads	Low traffic roads (e.g., residential roads and general access roads (Note 1), < 300 traffic movements/day)	low	X
	Roads (excluding low traffic roads, highly frequented lorry approaches to industrial estates, trunk roads/motorways)	medium	X
	Highly frequented lorry approaches to industrial estates	high	X
	Trunk roads/motorways	high	X

(Note 1) For the purposes of this assessment, based on National Roads Development Guide, it is assumed a 'general access road' categorisation allows up to circa 200 dwellings to be constructed off same.

It is therefore proposed to consider the appropriate SUDS treatment train to suit the land use of commercial roof and non-residential parking.

To determine the appropriate SUDS treatment measures for the development the SIA available tool / spreadsheet advises:

> If the land use varies across the runoff area either use the land type with the highest pollution hazard index or apply the approach for each land use type to determine if the SUDS design is sufficient.
>
> Where multiple levels of treatment are proposed the pollution mitigation indices for treatment measures after the first stage treatment should be halved.

Based on the above, and utilising the SIA design tool, the chosen SUDS treatment strategy for the development is noted as:

Sources of pollution	Treatment Type Provided
Commercial Roof	Filter Drain
Non-Residential Parking	Pervious Pavements

The SIA design tool spreadsheet demonstrating compliance with the Simple Index Approach is attached in Appendix F and summarised below:

Non-Residential Parking

> Pollution Hazard Level for land use type: low
>
> Pollution Indices for Hazard level: Total Suspended Solids 0.5, Metals 0.4, Hydrocarbons 0.4
>
> Aggregated Pollution Mitigation Indices for chosen SUDS measures: Total Suspended Solids 0.7, Metals 0.6, Hydrocarbons 0.7

7.0 NETWORK DESIGN

Based on all of the parameters determined within the previous sections of the report the surface water network has been designed utilising MicroDrainage modelling software. A copy of the calculations is included within Appendix E. The reader is also referred to the relevant Bayne Stevenson Associates Limited drainage layouts, submitted with the application.

The volume of storage provided and demonstrated within the calculations as adequate to meet the restricted forward flow parameters, has been determined as 173m^3. Flow restriction measures will be controlled via a proprietary hydro brake system.

8.0 FOUL DRAINAGE

Foul drainage for the development will be designed in accordance with Sewers for Scotland 4 with connection to the existing Scottish Water network.

A pre-development enquiry has been made to Scottish Water which confirms they currently have capacity for this discharge.

A copy of the Scottish Water PDE response is enclosed within Appendix G.

It is proposed to connect the foul drainage to an existing private foul drain (proposed for future Scottish Water adoption) at the north of the site which has been agreed with the adjacent landowner. The foul drain then connects to the existing Scottish Water foul sewer as agreed with Scottish Water.

10.0 CONCLUSIONS

Flooding

The development is not shown to be at risk from flooding on the available SEPA flood maps.

Surface Water Treatment and Attenuation

With respect to CAR Regulations: The development is within the relevant criteria to fall under the SEPA authorisation classification of General Binding Rules and therefore no application to SEPA, for approval / authorisation is deemed necessary.

We confirm that the prosed design is compliant with the principals of General Binding Rules 10 and 11 which are the relevant rules for discharge of surface water run-off.

The SUDS strategy and treatment measures proposed have been developed in accordance with the Simple Index Approach contained within WAT-RM-08 and demonstrate the Pollution Mitigation Indices exceed the Pollution Indices for Hazard Levels for the development site.

The SUDS components have been selected in accordance with the SUDS manual, CIRIA C753.

Attenuation for the surface water, to restrict the forward flow from the development, is provided via proprietary storage system.

Surface Water Network

The surface water network and SUDS, where applicable, have been designed in accordance with Sewers for Scotland 4 to maximise the areas for potential adoption by Scottish Water.

Local Authority Guidelines

The system has been designed to accommodate the 1 in 30-year return period including 40% climate change with no flooding within the site.

Checks have been made to the 1 in 100 and 1 in 200 year return periods including 40% climate change and any flooding from the system will be stored within the site.

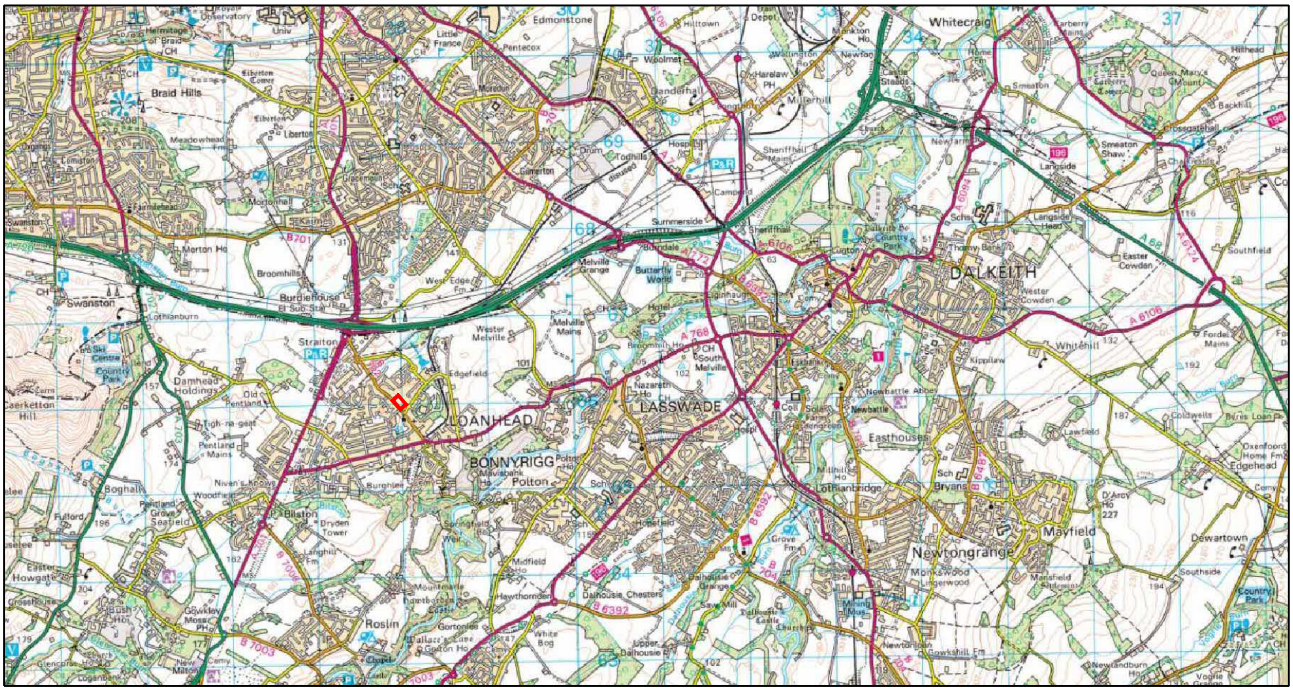
Foul Drainage

Foul network is to remain private and connect to the adjacent landowner's private network (proposed for future Scottish Water adoption) as agreed and then discharge to the existing Scottish Water foul sewer.

Appendix A

Site Location Plan

OS Location



Aerial View

Denotes Site Boundary

National Grid Reference
327950, 666010

Site Area
0.4Ha

Nearest Postcode
EH20 9EE

Project
Proposed Care Home,
Hawthorne Gardens, Loanhead

Drawing Title
Site Location Plan

Job Number	Drawn By	Coordinates Checked By	Boundary Checked By
J5416	PA	NB	NB

Appendix B

Scottish Water Existing Network Plan

Warning! Damaging a large diameter trunk main (12"/300mm and above) can result in loss of life and major water supply and water quality problems. If you're planning any extension work in the vicinity of any large diameter mains shown on our maps, you must contact Scottish Water to arrange a site visit 08000 778 778 WELL IN ADVANCE OF THE WORKS

Plotted By: s.paitock@bsascotland.com

The representation of physical assets and the boundaries of areas in which Scottish Water and others have an interest does not necessarily imply their true positions. For further details contact the appropriate District office.

Date: 07/09/2021

35416 - Hawthorne Gardens, Loanhead - Waste Water Network

SCALE: 1:2,646

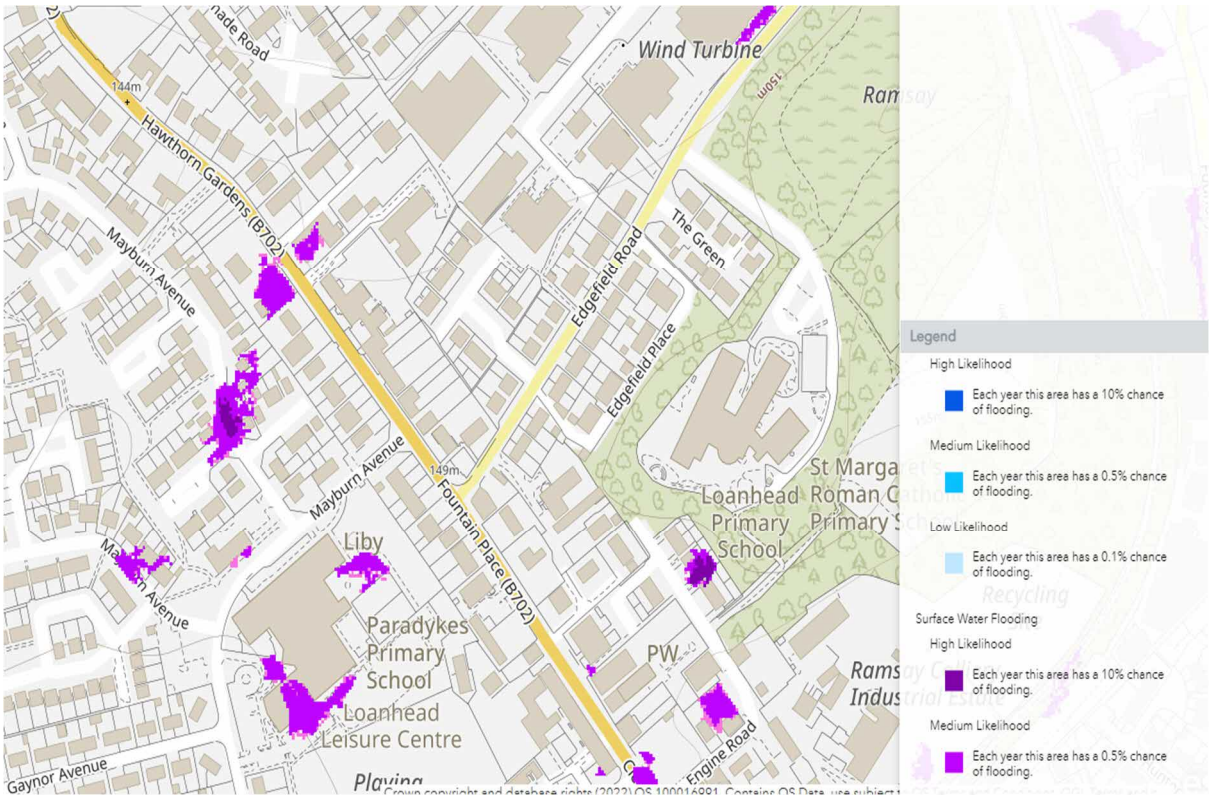
0 12.5 25 50 Meters

Scottish Water
Trusted to serve Scotland
Castle House,
6 Castle Drive,
Dunfermline,
KY11 8GG
Tel No: 08000 778 778

Appendix C

SEPA Flood Map

Flood Maps



Disclaimer and Terms and Conditions

All intellectual property rights are owned by SEPA or its licenses. The maps cannot be used for commercial purposes, by value added resellers or for income generation purpose. A full list of terms and conditions is available from the flood maps or be contacting flooding@sepa.org.uk.

The maps are indicative and of a strategic nature. Whilst all reasonable efforts has been made to ensure that flood aps are accurate for their intended purpose, no warranty is given by SEPA in this regards. Within any modelling technique there is inherent uncertainty. SEPA has assessed in the confidence it has in the maps and has shaded areas where data is not appropriate for user or where no data is available. It is inappropriate for these maps to be used to assess flood risk to an individual property.

Acknowledgements
The maps were developed using data from various sources. Full acknowledgment of data providers and participating parties is from the flood maps.

Maps created dates
Created: January 2014 This supersedes the Indicative River and Costal Flood Map (Scotland)
Updated: 3 March 2015
Updated: 2 December 2015

The flood maps reflect the knowledge and data that was available to in incorporated at the time of publication.

For further queries please contact flooding@sepa.org.uk

Appendix D

BSA Pre-Development Flood Routing Drawing No. J5416-081

NOTES

1. THIS DRAWING IS COPYRIGHT, RESERVED AND REMAINS THE PROPERTY OF BAYNE STEVENSON ASSOCIATES LTD.
2. THE CONTRACTOR AND HIS SUBCONTRACTORS/ SUPPLIERS ARE TO VERIFY ALL DIMENSIONS AND LEVELS ON SITE BEFORE MAKING SHOP DRAWINGS OR COMMENCING MANUFACTURE.
3. ONLY SCALE THIS DRAWING FOR PLANNING PURPOSES. DO NOT SCALE FOR CONSTRUCTION PURPOSES, ONLY USE FIGURED DIMENSIONS . THE CONTRACTOR IS TO BRING TO THE NOTICE OF THE ENGINEER ANY DISCREPANCIES CONTAINED IN THIS DRAWING PRIOR TO WORK COMMENCING. WHERE REQUIRED THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT DESIGN DRAWINGS & SPECIFICATIONS.
4. ALL WORK TO CONFORM TO THE RELEVANT EUROCODES / BRITISH STANDARDS AS APPLICABLE.
5. THIS DRAWING MUST BE READ IN ACCORDANCE WITH THE BAYNE STEVENSON ASSOCIATES LTD 'CIVIL & STRUCTURAL ENGINEERING SPECIFICATION' DOCUMENT. THE CONTRACTOR SHOULD ENSURE THE SPECIFICATION DOCUMENT IS AVAILABLE ON SITE FOR USE BY ALL CONTRACTORS.

THIS DRAWING MUST BE READ IN CONJUNCTION WITH BAYNE STEVENSON ASSOCIATES LTD HAZARD & RISK ASSESSMENT DOCUMENT. THE CONTRACTOR SHOULD ENSURE THE H & R DOCUMENT IS AVAILABLE ON SITE FOR USE BY ALL SITE PERSONNEL.

RESIDUAL HAZARDS IDENTIFIED DURING THE DESIGN STAGE THAT CONTRACTORS MUST TAKE COGNIZANCE OF:

HAZARD	DETAILS

THE ABOVE NOTED RISKS ARE LIMITED TO RISKS OUTWITH THOSE A COMPETENT CONTRACTOR SHOULD BE ABLE TO IDENTIFY & MANAGE. LIKEWISE THE ABSENCE OF ANY IDENTIFIED RISKS IN THIS TABLE DOES NOT IMPLY THAT NO RISKS EXIST BUT THAT NO RESIDUAL RISKS ARE DEEMED TO EXIST OUT WITH THOSE A COMPETENT CONTRACTOR SHOULD BE ABLE TO IDENTIFY AND MANAGE

THIS DRAWING HAS BEEN PREPARED UTILISING, AS ITS BASE, ARCHITECTS DRAWING No. _____
THE CONTRACTOR IS TO CHECK THE CURRENCY OF THE ARCHITECTS DRAWING, ADVISE OF ANY DISCREPANCIES AND THEREAFTER SEEK FURTHER INSTRUCTION IF FOUND TO DIFFER.

Rev	Description	By	Chk	Date
-	-	-	-	-

Client

Mansfield Care Ltd

Project

Proposed Care Home,
Hawthorne Gardens,
Loanhead

Drawing Title

Pre Development Overland Flow Layout

Issue Status

Approval

Drawing Number

J5416-081

Scale	Size	Date	Drawn	Chk	Revision
1:250	A1	25.04.23	SP	DP	-

0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000

Scale Bar @ 1:50
(mm)

Appendix E

Drainage Calculations

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Project				Job No.
Hawthorne Gardens, Loanhead				J5416
Element				Calculation Sheet No.
SWS Calculations				
Calcs By	Date	Checked By	Date	Revision
SP	April23	SP	April23	-

CALCULATIONS

Proposed Development: Care Homes

Design Parameters:

Scottish Water

The system should not flood under 1 in 30 year return period and comply with the design guidelines in "Sewers For Scotland" 4th Edition.

SEPA

Design to be in accordance with C753 "The SUDS Manual".

MidLothian Council - Flood Prevention

The system should be designed to attenuate the 1:30 year return period without flooding. Checks should be made to the 1:100 & 1:200 year return period and in the result of any flooding from the impermeable area storage should be provided for the flooded volume within the site.

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Hawthorne Gardens, Loanhead				J5416
Element				Calculation Sheet No.
SWS Calculations				
Calcs By	Date	Checked By	Date	Revision
SP	April23	SP	April23	-

CALCULATIONS

Summary of Micro Drainage Printouts

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	2
FEH Rainfall Version	2013
Site Location	GB 328872 662571 NT 28872 62571
Data Type	Point
Maximum Rainfall (mm/hr)	50
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.100
Maximum Backdrop Height (m)	5.000
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	IA Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	20.200	0.203	99.5	0.114	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	12.823	0.580	22.1	0.008	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	36.266	0.242	149.9	0.096	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	19.051	0.725	26.3	0.032	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	9.412	0.150	62.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	10.377	0.080	129.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	7.369	0.140	52.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ IA Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	38.17	5.33	143.500	0.114	0.0	0.0	0.0	1.01	17.8	11.8
1.001	37.89	5.43	143.297	0.122	0.0	0.0	0.0	2.15	38.0	12.5
1.002	36.43	6.00	142.490	0.218	0.0	0.0	0.0	1.07	42.4	21.5
2.000	38.69	5.16	143.200	0.032	0.0	0.0	0.0	1.97	34.9	3.4
1.003	36.20	6.10	142.248	0.250	0.0	0.0	0.0	1.65	65.8	24.5
1.004	35.85	6.25	142.098	0.250	0.0	0.0	0.0	1.15	45.6	24.5
1.005	35.69	6.31	142.018	0.250	0.0	0.0	0.0	1.81	71.8	24.5

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.006	3.056	0.068	44.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.006	35.63	6.34	141.878	0.250	0.0	0.0	0.0	1.96	77.8	24.5

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	5.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	3
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	2
FEH Rainfall Version	2013
Site Location	GB 328872 662571 NT 28872 62571
Data Type	Point
Summer Storms	Yes
Winter Storms	No
Cv (Summer)	0.750
Cv (Winter)	0.840
Storm Duration (mins)	30

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 5, DS/PN: 1.003, Volume (m³): 4.9

Unit Reference	MD-SHE-0066-2500-1750-2500
Design Head (m)	1.750
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	66
Invert Level (m)	142.248
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.750	2.5
Flush-Flo™	0.288	1.9
Kick-Flo®	0.590	1.5
Mean Flow over Head Range	-	1.9

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.6	1.200	2.1	3.000	3.2	7.000	4.8
0.200	1.8	1.400	2.3	3.500	3.4	7.500	4.9
0.300	1.9	1.600	2.4	4.000	3.7	8.000	5.1
0.400	1.8	1.800	2.5	4.500	3.9	8.500	5.2
0.500	1.7	2.000	2.7	5.000	4.1	9.000	5.4
0.600	1.5	2.200	2.8	5.500	4.2	9.500	5.5
0.800	1.7	2.400	2.9	6.000	4.4		
1.000	1.9	2.600	3.0	6.500	4.6		

Storage Structures for Storm

Porous Car Park Manhole: 1, DS/PN: 1.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	23.5
Membrane Percolation (mm/hr)	1000	Length (m)	11.5
Max Percolation (l/s)	75.1	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	144.500	Membrane Depth (mm)	0

Porous Car Park Manhole: 3, DS/PN: 1.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	16.0
Membrane Percolation (mm/hr)	1000	Length (m)	31.0
Max Percolation (l/s)	137.8	Slope (1:X)	40.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	144.500	Membrane Depth (mm)	0

Tank or Pond Manhole: 5, DS/PN: 1.003

Invert Level (m) 142.248

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	145.0	1.200	145.0	1.201	0.0

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	5.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	3
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 328872 662571 NT 28872 62571
Data Type	Point
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	30, 100, 200
Climate Change (%)	40, 40, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	30	+40%	30/15 Summer				144.129
1.001	2	15 Winter	30	+40%	30/15 Winter				143.454
1.002	3	960 Winter	30	+40%	30/15 Summer				143.011
2.000	4	15 Winter	30	+40%	200/360 Winter				143.259
1.003	5	960 Winter	30	+40%	30/15 Winter				143.007
1.004	6	960 Summer	30	+40%					142.130
1.005	7	960 Winter	30	+40%					142.045
1.006	8	600 Summer	30	+40%					141.911

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	HalfDrain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	0.479	0.000	1.81		5	30.4	SURCHARGED	
1.001	2	0.007	0.000	0.97			33.5	SURCHARGED	
1.002	3	0.296	0.000	0.18		528	7.2	SURCHARGED	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
2.000	4	-0.091	0.000	0.32			10.6	OK	
1.003	5	0.534	0.000	0.03			1.9	SURCHARGED	
1.004	6	-0.193	0.000	0.05			1.9	OK	
1.005	7	-0.198	0.000	0.04			1.9	OK	
1.006	8	-0.192	0.000	0.05			1.9	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	5.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	3
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 328872 662571 NT 28872 62571
Data Type	Point
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	30, 100, 200
Climate Change (%)	40, 40, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	100	+40%	30/15 Summer				144.551
1.001	2	15 Winter	100	+40%	30/15 Winter				143.803
1.002	3	960 Winter	100	+40%	30/15 Summer				143.318
2.000	4	960 Winter	100	+40%	200/360 Winter				143.314
1.003	5	960 Winter	100	+40%	30/15 Winter				143.313
1.004	6	960 Winter	100	+40%					142.131
1.005	7	960 Winter	100	+40%					142.046
1.006	8	960 Winter	100	+40%					141.912

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	0.901	0.000	2.06		4	34.6	SURCHARGED	
1.001	2	0.356	0.000	1.10			38.0	SURCHARGED	
1.002	3	0.603	0.000	0.23		688	9.3	SURCHARGED	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
2.000	4	-0.036	0.000	0.04			1.4	OK	
1.003	5	0.840	0.000	0.04			2.0	SURCHARGED	
1.004	6	-0.192	0.000	0.05			2.0	OK	
1.005	7	-0.197	0.000	0.04			2.0	OK	
1.006	8	-0.191	0.000	0.05			2.0	OK	

200 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	5.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	3
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 328872 662571 NT 28872 62571
Data Type	Point
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	30, 100, 200
Climate Change (%)	40, 40, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	200	+40%	30/15 Summer				144.609
1.001	2	15 Winter	200	+40%	30/15 Winter				143.972
1.002	3	960 Winter	200	+40%	30/15 Summer				143.957
2.000	4	960 Winter	200	+40%	200/360 Winter				143.953
1.003	5	960 Winter	200	+40%	30/15 Winter				143.951
1.004	6	960 Winter	200	+40%					142.135
1.005	7	960 Winter	200	+40%					142.049
1.006	8	960 Winter	200	+40%					141.916

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	HalfDrain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	0.959	0.000	2.18		4	36.5	SURCHARGED	
1.001	2	0.525	0.000	1.11			38.3	SURCHARGED	
1.002	3	1.242	0.000	0.27		560	10.7	SURCHARGED	

200 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
2.000	4	0.603	0.000	0.05			1.6	SURCHARGED	
1.003	5	1.478	0.000	0.05			2.5	FLOOD RISK	
1.004	6	-0.188	0.000	0.06			2.5	OK	
1.005	7	-0.194	0.000	0.05			2.5	OK	
1.006	8	-0.187	0.000	0.07			2.5	OK	

Appendix F

SEPA Simple Index Approach Assessment

SIMPLE INDEX APPROACH: TOOL

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. 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.

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	Pollution Hazard Indices: Pollution Hazard	Total Suspended Solids	Metals	Hydrocarbons
Select land use type from the drop down list (or 'Other' if none applicable): →	Commercial/Industrial roofing: Inert materials	Very low	0.3	0.2	0.05
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:					
	Landuse Pollution Hazard Index	**Very low**	**0.3**	**0.2**	**0.05**

DESIGN CONDITIONS: 1 | 2

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: →	Filter drain (where the trench is not designed as an infiltration component)	0.4	0.4	0.4
Select SuDS Component 2 (i.e. the second SuDS component in a series) from the drop down list: →	None			
Select SuDS Component 3 (i.e. the third SuDS component in a series) from the drop down list: →	None			
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:				
	Aggregated Surface Water Pollution Mitigation Index	**0.4**	**0.4**	**0.4**

DESIGN CONDITIONS: 1 | 2 | 3

1: 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

2: Filter drains should be preceded by 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
Select type of groundwater protection from the drop down list: →	None			
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**	**0**	**0**

DESIGN CONDITIONS: 1 | 2 | 3 | 4

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	**0.4**	**0.4**	**0.4**

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.

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**

DESIGN CONDITIONS: 1

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

SIMPLE INDEX APPROACH: TOOL

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. 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.

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	*Pollution Hazard*	*Pollution Hazard Indices* Total Suspended Solids	Metals	Hydrocarbons
Select land use type from the drop down list (or 'Other' if none applicable): →	Non-residential parking with infrequent change (e.g. schools, offices. < 300 traffic movements a day)	Low	0.5	0.4	0.4
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:					
	Landuse Pollution Hazard Index	**Low**	**0.5**	**0.4**	**0.4**

DESIGN CONDITIONS: 1 | 2

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: →	Pervious pavement (where the pavement is not designed as an infiltration component)	0.7	0.6	0.7
Select SuDS Component 2 (i.e. the second SuDS component in a series) from the drop down list: →	None			
Select SuDS Component 3 (i.e. the third SuDS component in a series) from the drop down list: →	None			
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:				
	Aggregated Surface Water Pollution Mitigation Index	**0.7**	**0.6**	**0.7**

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

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 3B

No ? Go to Step 3C

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
Select type of groundwater protection from the drop down list: → None			
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**	**0**	**0**

DESIGN CONDITIONS: 1 | 2 | 3 | 4

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	**0.7**	**0.6**	**0.7**

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.

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**

DESIGN CONDITIONS: 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

Appendix G

Scottish Water Pre-Development Enquiry Response

Thursday, 11 November 2021

Mark Bremner
19 South Castle Drive
Carnegie Campus
Dunfermline
KY11 8PD

Development Operations
The Bridge
Buchanan Gate Business Park
Cumbernauld Road
Stepps
Glasgow
G33 6FB

Development Operations
Free phone Number - 0800 389 0379
E-Mail - developmentoperations@scottishwater.co.uk
www.scottishwater.co.uk

Dear M Bremner,

Hawthorne Gardens, , Loanhead, EH20 9EE
ND Pre-Development Enquiry Application – Capacity Review
Our Reference: DSCAS-0048424-VPS
Your Reference: J5416

Thank you for your recent application regarding the above proposed development. Please note our reference number above, which should be quoted on all future correspondence.

Capacity Assessment

Scottish Water has carried out a Capacity review and we can confirm the following:

- There is currently sufficient capacity in the Glencorse Water Treatment Works to service your development.
- There is currently sufficient capacity in the Edinburgh Waste Water Treatment works to service your development.

Network Assessment

- There are no issues currently identified within our **water** and **wastewater** network that would adversely affect the demands of your development.

Please Note

- This response is valid for **12 months** from the date above and may be subject to further review
- Water – Point of connection - The previous site had a connection from the 6" CI in B702/Hawthorne Gardens. This should be suitable to be re-used for the site to be

re-purposed as a care home. If not a new connection can be taken from 6" CI ensuring the old connection is fully abandoned.
- Waste - Approved on the basis an attenuated surface water discharge of 2.5 l/s will drain to the surface water sewer on Mayburn Avenue only.

General Note

- Scottish Water's current minimum level of service for water pressure is 1.0 bar or 10m head in the public main. Any property which cannot be adequately serviced using this pressure may require private pumping arrangements installed, subject to compliance with the current water byelaws.

- Scottish Water is unable to reserve capacity therefore connections to the water and wastewater networks can only be granted on a first come first served basis. For this reason, we will review our ability to serve the development on receipt of an application to connect.

- Please be advised that Scottish Water will only accept surface water into the combined network under exceptional circumstances. In the consideration of any development, if due diligence has been carried out in fully investigating the available options for surface water drainage and if all of these options are subsequently deemed unreasonable to pursue, the remaining alternative options can then be considered for approval to allow the development to proceed.

- Unless stated on your PDE application, the drainage is assumed to propose to connect to our network via gravity without the use of a pumping station. If this is not the case, then please let us know as soon as possible because Scottish Water would need to reassess this case.

Next Steps

This response is in relation to the information you have provided in your application. If there are any changes to your proposed development you may be required to submit a new Pre-Development Enquiry application via our portal or contact Development Operations.

You will require to apply for technical approval for your waste water/water infrastructure from our technical team. In order to apply for this you will need to apply through a Licensed Provider. For further details on the Licensed Providers available at present please go to www.scotlandontap.gov.uk

I trust the above is acceptable however if you require any further information regarding this matter please contact me on **0800 389 0379** or via the e-mail address below.

Yours sincerely

Christy Shaw
Development Operations Analyst
Tel: 0800 389 0379
developmentoperations@scottishwater.co.uk

Scottish Water Disclaimer:

"It is important to note that the information on any such plan provided on Scottish Water's infrastructure, is for indicative purposes only and its accuracy cannot be relied upon. When the exact location and the nature of the infrastructure on the plan is a material requirement then you should undertake an appropriate site investigation to confirm its actual position in the ground and to determine if it is suitable for its intended purpose. By using the plan you agree that Scottish Water will not be liable for any loss, damage or costs caused by relying upon it or from carrying out any such site investigation."