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# ROSLIN EXPANSION SITE

## DRAINAGE ASSESSMENT



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of EDINBURGH

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## **1.0 INTRODUCTION**

### **1.1 Background**

This Drainage Assessment Report is submitted on behalf of the University of Edinburgh in support of a Planning Permission in Principal Application, which will include residential units and associated infrastructure and landscaping.

### **1.2 Scope of Report**

The Drainage Assessment Report has been prepared in accordance with "Water Assessment and Drainage Assessment Guide" (SEPA 2016).

### **1.3 Consultation and Data Sources**

The following sources have been used in the compilation of this Drainage Strategy Plan:

- Proposed Masterplan.
- Topographical Survey Data.
- Scottish Environment Protection Agency Flood Risk Mapping.
- Scottish Water Sewer Record Plans.
- CIRIA SUDS Manual C753
- Sewers for Scotland (3rd Edition)
- SEPA Flood Map

## **2.0 EXISTING SITE DESCRIPTION**

### **2.1 Site Location**

The site is located to the northwest of Roslin, in Midlothian, approximately 8.5 miles south of Edinburgh City Centre and east of the A701.

The location of the site is included in Appendix 2a.

### **2.2 Detailed Site Description**

The total application site area extends to approximately 11.5ha and comprises two agricultural fields, divided by a field boundary of post and wire fence, discontinuous hedgerow and trees crossing southeast-northwest near the centre of the site. A track runs along the northern boundary of the site, with a copse of mature trees at the western extent of the northern boundary.

Beyond the site boundary, housing, both constructed and under construction, lies to the south, with woodland along the western boundary screening the site from a core path. To the north are further agricultural fields, where the Kill Burn cuts through in a channel, north east of the site the Kill Burn and small tributary, thought to relate to surface water discharge from the housing site to the south as well as field drainage from the site, flow towards a culvert beneath the B7006. East of the site is an agricultural field, beyond which is the B7006.

### **2.3 Topography**

The ground gently undulates but in general falls south and east from a high of approximately 163m AOD in the northwest corner towards the southern boundary, before falling north eastwards to a low of approximately 147m AOD in the north eastern corner.

The existing topography and natural drainage flow paths are indicated on the drawings included in Appendix 2b.

### **2.4 Existing Watercourses and Drainage**

The Kill Burn, and its short tributary are the only watercourses of note within, or within close proximity to, the site. After passing beneath the B7006 the burn flow north east in a wooded corridor until approximately 770m northwest of the site where burn sinks after a waterfall at the southern edge of disused workings associated with the former Loanhead Colliery. The burn issues approximately 1.2km northeast of the site to combine with Bilston Burn.

The Kill Burn is not recorded by SEPA, therefore its catchment area is likely below the 3km<sup>2</sup> limit SEPA assesses.

Scottish Water returns from March 2018 show proposed sewers in the south west corner of the site, which it appears will serve the housing development south west of the site. These run north east, before turning to run along the path south of the site then connecting into existing drainage.

Outwith the site boundary, surface water and foul sewers run in parallel adjacent to the southern boundary, with the surface water outfalling to the tributary of the Kill Burn and the foul entering a pumping station north east of the site and pumped north along the B7006.

The outfalls in the north east corner of the site suggest there is field drainage within the development site.

### **3.0 PROPOSED DEVELOPMENT**

#### **3.1 Proposed Development Layout**

Details of the proposed land uses are illustrated in Appendix 3a – Masterplan, this includes extent of proposed development for residential uses, along with associated gardens, roads, drainage and landscaping areas (including SUDS facilities). This report is to support the Planning Permission in Principal Application and consequently the Masterplan as illustrated in Appendix 3a may be subject to change.

## **4.0 REFERENCE SOURCES**

### **4.1 Midlothian Council**

Midlothian Council require a Drainage Assessment and Flood Risk Assessment to be submitted to support the planning permission in principle application.

The Flood Risk Assessment is being prepared as a separate report.

This drainage assessment report has been prepared on the basis of SEPA's "Water Assessment and Drainage Assessment Guide".

### **4.2 SEPA**

Review of the SEPA Indicative River & Coastal Flood Map (Scotland) indicates that the site is shown to be outside areas at risk from flooding events from coastal and fluvial waters. Limited areas of surface water flooding are identified within the application boundary; however the redevelopment of the site area will ensure that these limited areas are drained into the new surface water system and earthworks platforming to prepare the site for housing will remove low areas.

### **4.3 Scottish Water**

Sewer Records were obtained from Scottish Water and they demonstrate that there are public foul and surface water sewers adjacent to the southern boundary of the site, running in parallel with the edge of the site. The existing surface water outfalls to the Kill Burn, whilst the foul discharges through gravity sewer along the site boundary to the pumping station located to the north east of the development boundary before being pumped along the B7006.

There are proposed sewers shown on the Scottish Water returns for the site area, adjacent to the southwestern extreme of the site. These appear to serve the housing development to the south west of the development area. These run northeast before turning to run along the path south of the site and connecting into existing drainage.

A Pre Development Enquiry was submitted to Scottish Water to determine if capacity is available within the local network to accommodate the proposed development. A Network Impact Assessment has been carried out by Scottish Water for the whole Roslin area and they have advised that a separate DIA will not therefore be required for this site.

Details of the existing water and drainage networks provided by Scottish Water are included within Appendix 4c. The PDE enquiry has been included as Appendix 5D.



## 5.0 DRAINAGE ASSESSMENT

### 5.1 The Surface Water Drainage Strategy

The new hardstanding areas of the development will be served on a separate system of drainage. Surface water SUDS elements will be integrated within the development area, to best respond to the levels and land uses proposed. Drainage shall comply with CIRIA C753 The SUDS Manual, Sewers for Scotland 3 and the SEPA guidance, Regulatory Method (WAT-RM-08) Sustainable Urban Drainage Systems (SUDS or SUD Systems).

The SUDS facilities will respond to the nature and topography of the site in order to mimic the natural drainage arrangements as far as possible. SUDs facilities have been appropriately sized for the scale of development and in accordance with the Council guidelines for storm events and the discharge criteria.

The drainage strategy has been developed based on the masterplan area, the catchment area has been assessed on the basis of the Simple Index Approach (Table 26.2 & Table 26.3 C753 The SUDS Manual) as follows.

**Table 1 – Pollution Hazard Indices and Corresponding SUDS Mitigation Indices.**

Type of contributing Area	Treatment Component	Hazard & Mitigation	Total suspended Solids	Metals	Hydro-carbons
Low Traffic Roads		<i>Hazard</i>	<i>0.5</i>	<i>0.4</i>	<i>0.4</i>
	Basin	<b>Mitigation</b>	<b>0.5</b>	<b>0.5</b>	<b>0.6</b>
	Pond		<b>0.7</b>	<b>0.7</b>	<b>0.5</b>
Residential Parking		<i>Hazard</i>	<i>0.5</i>	<i>0.4</i>	<i>0.4</i>
	Basin	<b>Mitigation</b>	<b>0.5</b>	<b>0.5</b>	<b>0.6</b>
	Pond		<b>0.7</b>	<b>0.7</b>	<b>0.5</b>
Residential Roofing		<i>Hazard</i>	<i>0.5</i>	<i>0.4</i>	<i>0.4</i>
	Basin	<b>Mitigation</b>	<b>0.5</b>	<b>0.5</b>	<b>0.6</b>
	Pond		<b>0.7</b>	<b>0.7</b>	<b>0.5</b>
Core Roads		<i>Hazard</i>	<i>0.7</i>	<i>0.6</i>	<i>0.7</i>
	Swale/ Filter Drain	<b>Mitigation</b>	<b>0.7</b>	<b>0.7</b>	<b>0.8</b>
	Filter Trench/ Basin	<b>Mitigation</b>	<b>0.65</b>	<b>0.65</b>	<b>0.7</b>

Review of the site investigation data suggests that the existing ground may not be suitable for infiltration. The surface water runoff will therefore be discharged through a new surface water sewer to the sewer that outfalls to the Kill Burn.

## 5.2 Existing Run-off Rates

The site has been assessed for Pre-Development runoff rates and this results in a runoff rate of 50.1l/s.

The proposed SUDs facility will have a flow control device set to limit the discharge to 50.1l/s, up to and including to the 100 year return event. The outfall will discharge into existing 750mm diameter surface water sewer to the east of the development parcel, prior to discharge through existing outfall to the Kill Burn. Through detailed development of drainage layout, it may be required to construct a new outfall for the site.

Exceedance flows from the 200 year event will be directed by overland flow/ spillway to the Kill Burn corridor.

## 5.3 Attenuation Volumes Required

An assessment of the potential storage volumes required for the site at the 100 year event plus 30% climate change is noted below. These will be subject to further detailed sewer analysis at the detailed design stage and do not take account of the volume of storage available within pipework. The layout, location and size of attenuation provided therefore will be further refined through the detailed design of the drainage network.

- SUDS Basin = 4,700m<sup>3</sup>

The network and the attenuation systems will be designed in accordance with Sewer for Scotland (3rd edition). This will include the network being designed to provide attenuation ensuring no flooding up to and including the 30-year event + 30% Climate Change in order to satisfy Scottish Water sewer vesting/adoption criteria. The attenuation will also accommodate the 100-year event +30% climate change as best practice for SUDS design.

In addition and in accordance with the "Water Assessment and Drainage Assessment Guide", the network design calculations shall be run and checked for events up to the 200 year storm event plus 30% allowance for Climate Change with potential exceedance to be accommodated within application boundaries and without detriment to properties. The SUDS basin currently shows an overland flow/spillway to the Kill Burn to accommodate the exceedance events over and above the 100 year event, therefore no detriment to properties is anticipated.

Detailed design will refine the storage volumes required and identify any additional storage requirement or flow routes for exceedance above the 1 in 100 year + 30% Climate Change and up to the 200-year plus 30% allowance for climate change.

#### **5.4 Drainage Layout Plan**

A drawing has been prepared showing the indicative location of SUDS facilities and discharge points. This drawing also includes the development footprint. Measurement of likely permeable and impermeable areas has also been included in this drawing - refer to Appendix 5b.

#### **5.5 Design Return Events and Climate Change**

The drainage system will be designed to attenuate the 1 in 30-year rainfall event including a 30% uplift to account for climate change, the attenuation facilities will also accommodate up to the 100-year event plus 30% climate change. It is proposed that surface water be attenuated within SUDS facilities/features. The development of the site area proposed as per Appendix 3a, will discharge to the Kill Burn at the pre-development runoff rate of 50.1l/s.

#### **5.6 Approvals required for Surface Water Network**

In order to comply with the European Water Framework Directive, the Scottish Government implemented the Water Environment (Controlled Activities) (Scotland) Regulations 2005 commonly known as the Controlled Activity Regulations (CAR). A review of the regulations has determined that the proposed development satisfies General Binding Rules 10, 11 and 21 and therefore will not require a registration or licence for the surface water proposals from SEPA.

Planning permission is required for above ground SUDs features and the planning approvals will be secured via a series of detailed planning applications.

Scottish Water Sewer Technical Approvals (STAs) will be required for the adoptable sewer networks, including the SUDs measures and Scottish Water process such applications following the issue of a planning consent.

#### **5.7 Method Statements for SUDS at Construction Stage**

During the construction phase of the development all works will be carried out in accordance with PPG6: Working at Construction and Demolition Sites and supporting guidance WAT-SG-94: Sector Specific Guidance – Construction Sites.

Compliance with PPG6 will be achieved by designing and phasing the works to employ appropriate management solutions such as cut off filter drains and temporary settlement lagoons.

A CAR license to control discharges from the proposed site during construction phase will be required and a pollution prevention plan will be submitted to SEPA.

## **5.8 SUDS Maintenance Arrangements**

The drainage within the development area will be offered for adoption by Scottish Water (including SUDS facilities) where applicable, drainage within private plots will be the responsibility of the plot owner. Highway drainage will be adopted by Midlothian Council where identified within the Road Construction Consent process.

## **5.9 Foul Drainage**

The Scottish Water Pre-Development Enquiry was submitted to Scottish Water to identify any upgrade required to allow the development to connect to their network and points of connection to be identified accordingly.

Scottish Water have advised that a DIA will not be required as a more detailed network wide assessment, a NIA (network Impact Assessment) has been undertaken by Scottish Water and includes the development area. It is anticipated that the development area will discharge to the existing pumping station to the north east of the site area. Once the Network Impact Assessment has been released by Scottish Water it will be possible to determine what upgrades, if any, are required to the local network and the pumping station to service the proposed development.

## 6.0 CONCLUSIONS

### 6.1 Conclusions

- The site is shown to be outside areas at risk from flooding events from coastal and fluvial waters on the SEPA Indicative River & Coastal Flood Map (Scotland).
- Limited areas at risk from surface water (pluvial) flooding are identified within the application boundary. The detailed development layout removes this risk as the proposed development will be served by new surface water sewers.
- The existing run off for the site has been calculated and is 50.1l/s.
- Detailed design of pipework and manholes will identify if any exceedance will be encountered within the network. Exceedance in excess of the 1 in 100 year + 30% Climate Change event will be directed to the Kill Burn corridor by overland flow/ spillway from the SUDS facility.
- Incorporation of SUDS measures within the detailed development design satisfies SEPA GBR criteria.
- SUDS facilities will be designed in accordance with The SUDS Manual - CIRIA C753 and Sewer for Scotland (3rd Edition) and the necessary permissions secured with Midlothian Council, SEPA and Scottish Water.
- Flows from the SUDS facilities are to be limited to the discharge rates set within the Surface Water Drainage Strategy drawing 50135/401– refer to Appendix 5b.
- Development levels will be such that overland flows are routed to the road corridors, open spaces and watercourse within the development area
- Construction phase measures satisfying PPG 6 and WAT-SG-94 are to be employed.
- Applications will require to be made to Scottish Water (residential) or licensed providers (non residential) for sewer connection agreements.

**APPENDIX 2a**

**Site Location Plan – 50135/102**