Barratt Homes West Scotland

Site E Robroyston, Glasgow Infrastructure Application

Drainage & SUDS Strategy

May 2021

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CONTROL SHEET

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Contents

Appendices:-

1. Introduction

This Drainage & SUDs Strategy Report forms part of the technical submissions presented to Glasgow City Council by our Client Barratt Homes West Scotland in respect of a Detailed Planning Application for Infrastructure to serve an area of residential development, which will be the subject of a separate application to be developed by others, amounting to c120 residential units, within an overall development of c550 at Site E, Robroyston, Glasgow. A Flood Risk Assessment, as prepared by Envirocentre for the original Planning submissions at the site, and further detailed information which may be relevant and pertaining to this report may be included in these documents. It should be noted that the original Planning submissions for the previous phase of development included the Fairhurst Drainage and SUDs Strategy Report, dated October 2020.

2. The Site

The proposed development site is located on the north east outskirts of Glasgow. Site E extends to some 19.8 hectares, sitting within the overall Robroyston development of 50 hectares or thereby. Current usage of Site E is greenfield, having been agricultural for several years.

The Infrastructure Area, for which the detailed application is being made, comprises roads, drainage and associated SUDs to serve a development area, to be developed by others, of c120 units in a mix of detached, semi-detached and terraced properties.

Ground topography for Site E generally slopes to the north and south east of the site.

The subject portion of the site lies within the catchment of the Stand Burn and surface water run-off from the proposed development will be routed to a tributary of same following appropriate treatment and attenuation.

3. The Development

The proposed Barratt Site E development referred to in this report comprises circa 550 residential units in total with the Phase 3 development being the first 166 dwellings to be constructed by Barratt associated with same. The Infrastructure Application comprises the proposed extension to the distributor road together with a new site access off the main spine road serving an eastern portion of the Robroyston Development to be developed by others as part of the overall Robroyston development. This distributor road gives access to the development areas and the remainder of the site which is located to the north of the M80, housing roads and cul-de-sacs, together with foul and surface water drainage and utility services.

A copy of the Development Masterplans are included in Appendix A for reference purposes only.

4. Foul Drainage

4.1 Drainage History

A record plan of the Robroyston area drainage has been obtained from Scottish Water and is included in Appendix B to this report.

A separate system of sewerage is located principally to the west and south-west of the subject site. However the topography is such that connection to the network will be by means of rising mains from foul water pumping stations located within the south east and north east sections of the overall development site.

4.2 Drainage Impact Assessment

Fairhurst understands that Scottish Water and the Landowner / Stewart Milne Homes have an agreement in place where, in return for a commuted sum of money, capacity within the Scottish Water network for this development was reserved.

At the time of writing Fairhurst has no further knowledge of this agreement.

4.3 Foul Drainage System

The foul drainage infrastructure for the development will be collected from the development areas and routed by gravity to the main collector sewers located generally within and below the main roads serving the development site.

The main routes of foul drainage are shown on the diagrammatic drawing contained within Appendix C. Where sewers are not located within publically maintained areas, adequate wayleave provision will be made to allow long-term maintenance by Scottish Water.

The drainage will progress in accordance with core infrastructure requirements and phasing for the development and will be designed and constructed in accordance with 'Sewers for Scotland 4'.

The foul drainage design for the dwellings proposed for the site is based on an allowance of 4,000 litres per day (peak) per dwelling.

As the drainage network for the subject site cannot connect with the existing Robroyston sewer network via a gravity connection, all the foul drainage from the development site will be routed to the foul water pumping station constructed as part of the initial development phases, located in the north east portion of the site, and from there it shall be pumped by means of a pressurised rising main to a suitable point of connection with the existing network. It should be noted that the foul drainage from the southern portion of the development, to which this application applies, will also require a separate foul water pumping station which will connect into the primary sewerage infrastructure on the distributor

road by means of a pressurised rising main. From here it will gravitate to the main foul water pumping station which will service the site.

Foul drainage for Site E, including the proposed drainage from the Infrastructure Application and the development it will serve, will be routed to the Waste Water Pumping Station 2 located at the south east of the site. This WWPS was designed by AECOM and approved by Scottish Water previously and has capacity to service the Site E development in full.

The rising main route and extent and required gravity sewer to a point of connection to the network is shown on the Foul Water Drainage Schematic drawing in Appendix C.

The foul water pumping stations were designed so they can adequately service all phases of the development and were designed in accordance with 'Sewers for Scotland 3', such that on completion, and following an appropriate period of maintenance, they will ultimately be adopted by Scottish Water.

The final pumping station design will incorporate all necessary alarm systems and telemetry to warn Scottish Water, or whoever is appointed to carry out maintenance on their behalf, should there be any issue with the pumps servicing this facility. Previous experience with such arrangements suggests that SEPA would not wish an emergency overflow from the pumping stations to the nearest watercourse and that storage will require to be provided. This can be accommodated by providing suitably sized chambers adjacent to the pump sump which would fill at a time of failure of the pump system for whatever reason, and then be drawn down to empty when the pumps come back on line.

The pumping station has been located to allow access to be made by Scottish Water, as required.

5. Surface Water Drainage

5.1 Existing Run-Off

The site was divided into three sub-catchments, commensurate with the areas draining to each of the proposed basins and Greenfield run-off rates were estimated for each of the three drainage catchments using the IH124 method based on a 2 year Greenfield run-off rate. These rates are calculated using variable parameters associated with the site slope, average rainfall and the soil/ground conditions present on the site.

The calculated value of equivalent Greenfield run-off rates/allowable discharge values for each of the catchment areas are shown on the drawing located in Appendix D. These values are used in the drainage calculations to limit flows from the attenuation structures and drainage simulation which ensure no on-site flooding in 1 in 200 year events with 10% allowance for Climate Change as agreed with Scottish Water given this was the allowance used at the time when the receiving basins were designed.

5.2 Surface Water Drainage Proposal

Surface water run-off will be collected by means of a separate drainage system and ultimately discharge, following treatment and attenuation, to a tributary of the Stand Burn. The proposed gravity surface water network is shown on the diagrammatic drawing contained within Appendix E. The surface water system for the infrastructure and the development plot will be constructed to tie into the main core infrastructure which will service the development, Appendix E refers. Sewers have been sized and positioned at appropriate levels to allow this to take place as part of the phasing shown.

The surface water sewers will be designed in accordance with Sewers for Scotland 4 and will be designed to ensure that there is no surcharging of the pipes/manholes in a 1 year return rainfall event nor flooding of manholes within the development site for a variety of rainfall events and return periods up to 1 in 30 years. In addition it should be noted that the discharge to the watercourse, from each of the detention basins serving the development site, will not exceed the equivalent predevelopment Greenfield run-off value. Storm return periods in excess of 30 years are considered in Section 5.3.

5.3 Surface Water Attenuation

Surface water run-off during extreme rainfall events will be attenuated within the two detention basins previously constructed as part of the previous phase of development together with a further basin to serve a portion of the Barratt Site E development. The location of the basins together with typical construction details are shown on the drawings included within Appendix G.

The basins were designed to comply with the requirements for Sewers for Scotland 3rd Edition, which were current at the time of design, which contains Scottish Water's construction standards for two types of SUDS namely, detention ponds and detention basins.

Each of the basins has been sized to attenuate surface water run-off in accordance with the requirements to ensure that there is no flooding on site during a 1 in 200 year rainfall event. The discharge from each basin/pond arrangement is limited by means of a vortex flow control device which ensures efficient discharge flows at low water head.

In keeping with good practice each basin incorporates a 300mm minimum freeboard together with a perimeter overflow, routing any potential spill flows to the watercourse.

All basins are located to allow vehicular access by Scottish Water and a perimeter access track is located adjacent to service each basin.

5.4 Surface Water Outlets

Each of the basins will discharge the surface water following treatment and attenuation to the adjacent watercourses. A typical headwall detail is shown in Appendix F and the construction of each will be in accordance with SEPA's General Binding Rules and if necessary, a CAR Licence will be applied for in order to carry out these works.

6. SUDS

6.1 Levels of Treatment

It is proposed to provide treatment to surface water prior to discharge to the adjacent watercourse, namely the unnamed tributary of the Stand Burn, in order to improve the quality of run-off from hard-standings such as roofs, roads, driveways and parking courtyards.

In order to comply with previous masterplan submissions, treatment will be in accordance with CIRIA document: 'The SUDS Manual (C697)' and SEPA's Regulatory Method (WAT-RM-08) 'Sustainable Urban Drainage Systems' issued in September 2010. With reference to current good practice for sustainable urban development, two levels of treatment are required for residential developments. One level of treatment is acceptable for roof run-off only.

A further check has been made using SEPA's 'Simple Index Approach' tool, and this confirms that adequate treatment is provided for the development.

6.2 Treatment Provision

Within the residential development area, the in-curtilage run-off from roofs, paths and driveways, roads and car parking areas will generally be collected and routed to a basin which will provide the initial required level of treatment.

From here, the discharge will be routed to another basin where a further level of treatment will be provided.

The discharge from the basin serving the remainder of the Barratt Site E development will be routed to a swale where a further level of treatment will be provided.

Basins are sized to accommodate the required treatment volume (Vt) within same.

Following treatment and attenuation surface water will discharge to the unnamed tributary of the Stand Burn from the basins at a rate that does not exceed the predevelopment equivalent greenfield run-off value.

Basin details are included in Appendix G.

6.3 Adoption and Maintenance

In regard to maintenance adoption of SUDS treatment and basins proposed for the development it is understood that all maintenance of SUDS within the boundaries or curtilage of a private property, such as a residential driveway or non-adopted parking courtyard is the responsibility of the landowner or occupier.

SEPA's latest guidance, states that it is their preference for SUDS constructed outwith the boundaries or curtilage of a private property to be adopted by Scottish Water, the Local Authority or a public body and, as such, SEPA would look to have a confirmed arrangement in place for the long term maintenance and sustainability of any SUDS implemented.
Glasgow City Council Roads and Scottish Water have already commented on the proposed adoptive status of the proposed basins and ponds at Phase 1 such that they will, subject to a formal legal agreement between all parties, adopt the SUDs features as follows:

- Scottish Water will adopt and maintain the end of line ponds together with all associated upstream pipework.
- Glasgow City Council Roads will adopt and maintain the basins.

In addition we understand that the Developer will agree that the long term maintenance of the basins in terms of grass cutting will be vested in a factor appointed on their behalf.

7. Flood Routing

7.1 Flood Routing within the Infrastructure Application

Preliminary calculations undertaken for the proposed surface water drainage system, performed using Windes Microdrainage software, have demonstrated that there are no incidents of flooding within the site during rainfall events up to and including the 1 in 200 year return period.

There is adequate attenuation storage within the basins proposed for the development to manage the surface water run-off during this return period. In addition, the network of pipework and manholes in each of the three surface water catchments provides an element of additional storage during extreme rainfall events.

Should any of the network pipes become blocked, for whatever reason, this could potentially result in surcharging and possibly flooding from the surface water manhole or manholes upstream of the blockage.

In the unlikely event of such a situation arising it is envisaged that the flood water from the manholes would generally be contained within the channel of the road kerbs and would therefore be routed to the road gullies downstream and therefore collected by the network. Where flooding of a manhole or gully would potentially occur outwith roads, checks have been made to ensure that flood waters can pass onwards and not collect to depth in low-lying areas or areas impounded by continuous structures such as buildings and walls.

It is not envisaged that an event such would represent a danger to persons or property within the development site and any localised flood spillage would follow a natural route towards the lower lying ground and watercourse.

Flood routing for the development is shown on the drawing contained within Appendix H.