

## Memo

To: Robert Griffin - Manchester City Council (robert.griffin@manchester.gov.uk)

|          |                                                                                    |        |                                   |
|----------|------------------------------------------------------------------------------------|--------|-----------------------------------|
| From:    | Alan Beningfield                                                                   | Email: | alan.beningfield@atkinsglobal.com |
| Date:    | September 2021                                                                     | Phone: | 01925 238000                      |
| Ref:     | 46-10w_Correspondence_409-07-004-A<br>Your reference: 126283/FO/2020 & CDN/21/0503 |        |                                   |
| Subject: | St Anthony's CPS – Drainage Memo – Rev A                                           |        |                                   |

**Application number:** 126283/FO/2020

**Proposal:** Erection of a detached single storey multi-functional teaching block, with associated welfare facilities, creation of new 40 space car parking and associated 6-metre-high lighting columns, access road and vehicular access from Culmure Road and installation of a Multi-Use Games Area.

**Location:** St Anthony's RC Primary School, Dunkery Road, Manchester, M22 0NT.

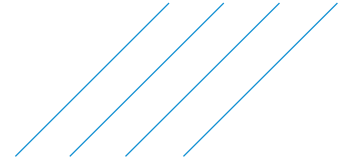
Robert,

Further to your previous correspondence (reference: Re: 46-10w - St Anthony's CPS\_ CDN/21/0503) please see below further updated information relating to the surface and foul drainage proposals for the above development; in addition, please see attached copies of the following documentation as requested:

- DOS-ATK-(46-10w)-XX-DR-B-0022-P4 (Proposed Outline Drainage Layout)
- DOS-ATK-(46-10w)-XX-DR-B-0026-P2 (Standard Drainage Details)
- 46-10w\_UU Correspondence (23.06.21)
- 46-10w\_Percolation Test Records

The proposed outline drainage plan (0022) details the proposed surface and foul drainage provisions for the development, drawing (0026) outlines the standards drainage details for the permeable paving, inspection chambers, silt traps and infiltration cells. As requested, the United Utilities correspondence details the discussions held with them regarding the existing water main and public sewer which traverses the site and proposed development area. As requested by United Utilities localised investigations were undertaken to determine the depth and diameter of the water main asset. The depth, diameter and invert levels for the public sewer were determined by observations of the existing manholes / inspection chambers on site. These details were confirmed back to them. As per the attached correspondence they have confirmed that there are no loading issues with the proposals, though they have highlighted that any proposed services traversing the assets and work in the vicinity should be in accordance with their 'Standard Condition for Works Adjacent to Pipelines'.

As per the previous correspondence and applications the existing private drainage network has been surveyed and inspected via CCTV survey. The schematic layouts are contained on the proposed layouts. A copy of the CCTV survey and associated report can be provided upon request if required. The results indicate that the existing on-site private network comprises a combined surface and foul water system; primarily 100mm diameter and comprising a combination of vitrified clay and polyvinyl chloride pipe work. The network to the north-east of the site in the vicinity on the proposed development captures the foul and surface water from the Year 6 Accommodation block standalone extension constructed in 2015. Various foul connections in the east of the schools (WC's and kitchen facilities) and various surface water connections in the locality (surface gullies, linear drainage, and main school building roof discharges). The above detailed existing combined private network collates at the north of the site the continues along the front elevation the main school building and it is assumed that this connects into the 225mm combined public sewer owned by United Utilities on Dunkery Road at the west of the site. Utility supplier searches have been undertaken for the vicinity of the proposed development. Copies of these (affected and not affected) searches can be supplied upon request. Local utility mapping has also been undertaken by electromagnetic and ground penetrating radar searches, these searches have also been overlaid onto the proposals. The existing surface water connections on site in the vicinity of the works will not be affected by the proposed development; the proposals being constructed on



an existing area of utility soft landscaped land. The proposed foul drainage provisions for the new build accommodation will connect into the existing combined private network at the north of the site towards then end of the network prior to connection to the public network as detailed on the attached proposed outline drainage layout (0022). The existing private network is considered to have adequate capacity for the additional foul drainage connections taking into account the proposed provisions and projected occupancy rate. The CCTV survey undertaken has identified localised defects (i.e. displaced joints and encrusted scaling) which will be addressed as part of the development and future planned maintenance programmes.

The proposed development site is within Flood Zone 1 (<https://flood-map-for-planning.service.gov.uk/>), and therefore low risk. There are no watercourses, ponds etc. in the local vicinity. The design of the proposed surface drainage system has been undertaken in with the requirements and recommendations of the site standards relevant to a low flood risk site. The proposed strategy looks to utilise infiltration for surface water and contain the surface water on site rather than discharging into to the existing combined private network and subsequent public combined network in line with the Building Regulations Approved Document H:

- *Surface water drainage should discharge to a soakaway or other infiltration system where practicable.*
- *Discharge to a watercourse may require a consent from the Environment Agency, who may limit the rate of discharge. Maximum flow rates can be limited by provision of detention basins.*
- *Where other forms of outlet are not practicable, discharge should be made to a sewer.*

As per our initial pre-application discussions regarding the proposals, a soakaway or other infiltration route was the preferred methodology and that a sustainable drainage solution should be pursued. Investigations have been undertaken to support the infiltration route; there are no watercourses in the vicinity that would allow off site discharge. And the discharge of surface water into the existing combined private network and subsequent public network was to be avoided and mitigated if viable.

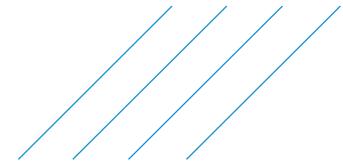
As per you request infiltration testing has been commissioned for the proposed development area to support the ground Investigation Survey findings. Copies of the testing reports are enclosed (reference: 46-10w\_Percolation Test Records). As discussed, following receipt of the enclosed testing reports the proposed surface water strategy for the accommodation block will be revised as detailed below.

The Ground Investigation Survey was undertaken in April 2020 to determine ground conditions and risk of contamination assessment. A copy of the report has been submitted under a separate cover previously. The ground investigation detailed within the above referenced report generally identified topsoil and made ground to depths of between 0.50m and 0.60m below the existing ground level underlain by sandy and gravelly material to depths of between 1.10m and 2.80m below ground level. Peaty soils were also encountered (WS05). Weathered mudstone and sandstone were encountered underlying the clay and penetrated to a maximum depth of 3.45m below ground level. Window Samples WS01 through WS02 were undertaken in the location of the proposed New Build Accommodation results of which are contained within Appendix 2 of the Ground Investigation Report. Trial Pits TP3 and TP04 were undertaken in the location of the proposed Car Park; results of which are contained within Appendix 2 of the Ground Investigation Report.

The Report on Ground Conditions Investigations noted that *'No definite groundwater strikes were observed in the exploratory holes during the investigation'* to the depths identified ranging between 2.5 and 3.45m depths. The existing area is currently grassed bounded by substantial hedge vegetation and mature trees. Historically this area has been well drained and there have not been occurrences of surface water pooling or the existing grassed area being waterlogged this has also been supported by observations during the period since the proposals have been developed.

As detailed previously the proposed development is located at the downstream end of the private combined network; it is not intended to connect surface water captured from the accommodation block directly into this network. However, the existing linear surface drainage to the west of the proposed accommodation block will be retained and utilised to capture surface water around the building from existing and proposed building perimeter hard standing. As detailed on the enclosed plans; considering the existing and proposed finished surface levels the overland flow routes for ground surface water to the building perimeter will be directed and fall to the existing linear drain to the west of the unit. The proposed surface water drainage network for the accommodation block is proposed in such a manner that any overland flow due to exceedance of the system is mitigated and contained by the overflow system. The existing surface water connections from the previous new-build Year 6 Block constructed in 2015 which already discharge unattenuated into the existing private network will be retained; albeit a number of inspection chambers will be modified to accommodate the change in surrounding surface material (i.e. soft landscaping to hard landscaping).

The surface water collected by the proposed hipped tiled roof for the accommodation block have been sized based on the guidance provided within Building Regulations Approved Document H. The maximum roof area to be drained to single gutter has been calculated to be 61m<sup>2</sup> (plan area 47.5m<sup>2</sup> x 1.29 for pitched roofs up to 30° pitch); therefore, allowances have been included for 125mm half round gutters laid to falls to the indicated drop points allowing a flow capacity of 1.37l/s. These vertical drop points will be served with 75mm diameter outlets connected into surface gullies.



As detailed on the attached plans the surface water captured by the roof will be collected and distributed by a new local surface water drainage network. These will discharge into a network of infiltration cells in order that the surface water does not discharge directly into the on / off site combined networks.

As per the enclosed infiltration test results, the proposed infiltration site (no. 1) to the north of the accommodation block has been discounted due to it not achieving the required 24hr 50% discharge rate; although the Ground Condition Investigation report indicated suitable substrate the test exposed quantities underlying unsuitable material which inhibited the discharge rate. The results for the proposed infiltration site (no. 2) to the south of the accommodation block were able to be established; the substrate being more granular material allowing infiltration. However, the 24hr 50% discharge rate was not achieved during the test. The 50% discharge rate was calculated to be 26.42hrs. Due to the rate being in exceedance of the requirements it is proposed to modify the strategy to accommodate this rate.

It is proposed that the infiltration cells system still be installed at the proposed site no.2 to the south of the accommodation, though introduce mitigation strategies. Although the required discharge rate has not been achieved infiltration is still occurring falling short of the required discharge rate by 2.42hrs. It is proposed to maximise the footprint area available for infiltration and capacity in this area to encourage the maximum infiltration output. An approximate footprint area of a minimum 20m<sup>2</sup> is potentially available considering existing site constraints. The Ground Conditions Investigations has previously detailed the suspected ground water level which would allow cells to be stacked vertically if required to increase capacity.

Due to 50% discharge rate not being achieved it is proposed to install an overflow route from the infiltration cells to accommodate for extreme weather events. The infiltration cells will allow a large percentage of the collated water to be naturally infiltrated during normal operating conditions; however, should the capacity of the cells be reached due to extreme circumstances then an overflow route will allow the excess to be discharged. It was intended to avoid connecting to the private on-site network; however, the test results have indicated that this will now be required as a contingency measure. The use of the infiltration cells system will also act as an attenuation system slowing the discharge of the water into the network as most of the water will be contained within the cells.

In circumstances where the overflow is required this will discharge into a catchment pit chamber as detailed on the enclosed plans (0022 and 0026) this chamber will be installed with the hydro-brake which will further slow the rate of discharge into the private network. Under regular conditions the hydro-brake would allow discharge to flow normally; but during peak flow events this flow would be restricted. The system would also be installed with one way back inlet valve to prevent flow from the existing private network entering back up the proposed system.

It is believed that the combined infiltration / attenuation system is sufficient to contain and manage the collated surface water from the accommodation block with much of the surface water being contained within the existing site. The overflow system will allow any excess to be attenuated on site and released into the private network after the peak flow of the event.

The proposed below ground infiltration cells are to be located a minimum 5.0m from the footprint of existing and proposed buildings. The top of the infiltration cells are to be installed a minimum 300mm below ground level (soft landscaped non-traffic area) and covered with graded backfill. The cells are to be fully wrapped in a minimum 2mm gauge geotextile edge sealed membrane commensurate with the cells and surrounded with a minimum 100mm cover of compacted 10mm (non-angular) granular gravel.

The capacity of the infiltration cells have been calculated to accommodate a minimum cumulative volume of 7.0m<sup>3</sup>. The capacity of the cells has been based upon the proposed roof area of 308m<sup>2</sup> (plan area 239m<sup>2</sup> x 1.29 for pitched roofs up to 30° pitch) multiplied by the coefficient for the rainfall intensity predication in millimetres per hour (50mm/hr as per Building Regulations Approved Document Part H).

- Volume = Roof Area x (Rainfall per hr / 3600).
- 4.27m<sup>3</sup> = 308m<sup>2</sup> x (50mm per hr / 3600).
- Add 40% capacity for future climate change increases = 5.98m<sup>3</sup> (increased to minimum 7.0m<sup>3</sup> as further contingency).

The initial proposal to split the infiltration site has been discounted, therefore the cells are to be contained into a single location. As detailed above a footprint area of approximately 20m<sup>2</sup> has been identified as being available which would be sufficient to accommodate the required cells taking into account site constraints and determined ground water levels. The above calculations have been determined based upon the evidence available and would be subject to review and amendment accordingly as required; the minimum storage capacity of 7m<sup>3</sup> identified will likely be exceeded to provide maximum opportunity for infiltration. The school also propose to harvest the rainwater in water butts connected to the rainwater downpipes to provide accessible water for school activities (i.e. gardening clubs and learning activities) which will also siphon off a



portion of the roof rainwater. Depending on the number of units installed and sizes this will divert several 100l of water at times which would be drawn off and replenishes as utilised.

The above strategy is the preferred methodology based upon the hierarchy of options and the initial pre-applications held with the local authority planning service; the option to discharge surface water to a water course has been discounted due to no viable location being available. The alternative solutions to discharge the surface water on site would be to extend the proposed new surface water network to the existing playing fields to the south of the development and install the infiltration cells in this location; though this would require traversing the existing playground and may require pumping to move the water along the required distance. This area has been included within the Ground Investigation Survey and has been proven to be suitable to accommodate infiltration with the 1200m<sup>2</sup> permeable surface Multi Use Games Area connected to this application installed in this area. This was installed in November 2020 and has been effectively draining with no ponding issues.

The proposed car park will utilise a porous asphalt system which will allow falling surface water to drain through the wearing courses, be attenuated in the sub-base layers and then discharged to the local ground conditions. The proposed surface materials are considered to be neutral and will not contribute and contamination risk to the existing sub-strata and groundwater table. The proposed car park surface would not require any surface treatment or cleaning. The proposed formation layers of the proposed car park surface will comprise the following:

- 40mm depth well compacted 10mm porous open grade binder course.
- 100mm depth well compacted 20mm porous open grade base course.
- minimum 250mm frost resistant type 3 open graded unbound attenuation sub-base granular reservoir.
- geotextile filter membrane.
- existing sub-grade.

The proposed car park area (1000m<sup>2</sup>) is less than area of the Multi Use Games Area (1200m<sup>2</sup>) which has been accepted and operates on the same natural infiltration methodology.

Should the above proposed methodology be deemed unacceptable then as a last resort the proposal would be to connect directly into the existing combined private network with no infiltration; however, this option is not being pursued and is not the preferred methodology and was not proposed as part of the application. Assuming that the drainage of the roof will be separated into two halves as indicated on the attached proposals discharging to two collected points, then the calculated peak flow rate from the proposed accommodation block has been estimated to be approximately 2l/s based on the Rational Method as summarised below:

- $Q = 2.78 C i A$

$Q$  = run-off in litres per second (l/s)

$C$  = non-dimensional catchment coefficient, which is dependent on the catchment characteristics (a figure of 1.0 is deemed appropriate)

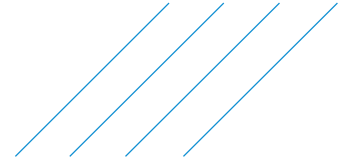
$i$  = rainfall intensity in millimetres per hour (50mm/hr in line with guidance from Building Regulations Approved Document Part H)

$A$  = Area being drained in hectares (0.019ha (plan area 119m<sup>2</sup> x 1.29 for pitched roofs up to 30° pitch).

Based upon the above should connection direct into to the existing private network without use of the infiltration system be required then the initial proposals would be to allow for a series of catchment manholes which will attenuate the surface water flows downstream in the private / public networks; these would be complemented by a series of hydro-brakes as detailed previously to limit the peak surface flows in line with the above flow rates.

As detailed previously the existing on-site linear surface drainage is to be retained will capture surface water landing on existing surfaces in the vicinity of the proposed structure. This combined with the cross fall to existing and proposed surfaces will direct surface water away from existing and proposed structures. As detailed above the surface water associated with the proposed development will be managed. There are no proposed sub-terranean structures (i.e. basements) associated with the development and there are no such structures in the local vicinity of the structure. All buildings on site being either single or two storey structures above existing ground level.

As detailed previously the proposed car park is to utilise a permeable surface allowing surface water to infiltrate through to the existing sub-strata as previously employed with the Multi Use Games Area. The proposed site has a slight topographical gradient. However, the proposed surface will be graded with cross falls to allow for the potential of increased volumes of surface water in unprecedented weather events. These falls will be provided in such a manner that should it occur, surface water will be directed to the perimeters of the car park, the perimeter of the proposed car park is bounded by concrete kerb upstands with grass verges. At specific catchment areas these locations will be provided with preformed drainage kerbs allow for discharge through the perimeter kerbs combined with inline side outlet to local soakaway / land drain areas comprising



granular fill and perforated pipework to areas of existing natural soft vegetation / landscaping therefore directing any collected surface water away from existing / proposed structures.

In terms of maintenance of the completed structures; the infiltration cells will be in non-traffic areas and designated as non-development areas in order that they can be exposed and accessed at future date if required. Access points to the system are also provided at connections / directional changes to allow for future access and maintenance. Rodding points will also be incorporated into both the surface and foul network systems. The proposed new surface water network is to be installed with preformed silt traps prior to the inlet locations which will allow and silt / debris to be filtered prior to entry. The proposed traps are detailed on the attached plans and include preformed catchment pit, removeable silt bucket and alloy screen in order to filter fine particles. As part of the on-going future maintenance of the development the site management team will be required to routinely clear these traps and maintain the system as well as ensuring gutters, gullies etc. are kept clear of detritus (i.e. leaves etc.) as part of their on-going site planned maintenance programme.