

As a local resident and member of the Chelmsford Road area Residence Association I would like to raise some observations in relation to the proposal submitted by Croudace for housing development on Officers Meadow, Shenfield, with specific reference to the Drainage and Flood Risk Assessment report and associated Biodiversity Net Gain and Woodland Management reports.

These observations constitute the reason why I believe the development should not be granted approval without further investigations to provide an integrated understanding of the potential impacts within and across the development boundaries in relations to questions concerning impacts that may arise in relation to other proposed developments on adjoining sites.

Hydrological impacts of development within the Shenfield watercourse catchment

The site proposed for development is located at the bottom of the catchment area draining from the main part of Shenfield Village, Hutton Mount and the Hutton Poplar and Woodland Avenue areas where the Shenfield watercourse, identified within the Croudace Drainage and Flood Risk Assessment report, acts as the main outlet via the Chainbridge watercourse and into the river Wid

- The Environment Agency Flood Risk map, reproduced as Figure 4.1 in the report, identifies the low lying area along the Shenfield watercourse are deemed unsuitable for development, and this is also supported by additional runoff simulations produced for the report. The area to the south of the Shenfield watercourse is retained within the proposed development based on evaluation of exception criteria while the majority of the proposed development is now concentrated to the north and north east away from the Shenfield watercourse
- Based on the shallow gradients of the slope draining into the Shenfield watercourse and the absence of any draining channels runoff from this area is currently expected to occur via rainwater infiltration and subsurface flows towards the Shenfield watercourse where any local contribution is predominantly as emerging groundwater after prolonged storage within the banks of the Shenfield watercourse
- The runoff simulation study appears to focus on water management within the proposed development site with little or no considerations of upstream and downstream impacts from a change in the water management regime within the development site with more rapid release of surface water runoff into the Shenfield watercourse, notably
 - An increased water level in the Shenfield watercourse may impact the inflow already conveyed via the this watercourse from the upstream catchment and could impact surface water flooding along Long Riding, identified as an existing high risk area within the Environment Agency Surface Water Flood Risk map reproduced as Figure 4.2 in the report
 - An increase the volume of water to the stretch of the Shenfield watercourse downstream of the proposed development site may also act to restrict existing groundwater drainage from the area between Chelmsford Road and the A12 including the area under development for the Hutton FC football pitches also identified as a high-risk area within the EA maps
 - It would also be beneficial to understand the combined effect of the development proposed by Croudace and the development being considered on the site between Chelmsford Road and the A12 roundabout in terms of impacts on the Chainbridge watercourse and any associated need for initial and ongoing maintenance to manage the increase in output across all catchments including agreement on how this should be funded and by whom in terms of rates or ground rents for properties within the proposed developments or within the general Council budget

Hydrological impacts within the upper Officers Meadow and Fen Close areas

The report fails to acknowledge that about a quarter of the proposed development to the north and north east is located outside the catchment of the Shenfield watercourse and currently drains across the ancient woodland and along the adjoining field targeted for development by Redrow and into the river Wid

- From a standard catchment delineation approach the catchment boundary of the upper Officers Meadow area follows a curve from south of the large oak tree situated by the man-made depression towards to the railway line at the northeast of the proposed development site and to the area immediately north of the proposed location of a new primary school
- The proposed water management strategy will therefore also move any surface runoff from this area into the Shenfield watercourse and remove this from the runoff contribution to the ancient woodland and into the Redrow site
- The corner furthest to the north marking the access point from the proposed Croudace development site across the ancient woodland to the proposed Redrow development site is subject to seasonal waterlogging, as can be testified by all regular dog walkers and many others using the paths across this part of Officers Meadow, and the area is also included in the EA surface water flood risk map in Figure 4.2 (also available as an interactive map on the BBC website) illustrating this as the main drainage access point from the upper Officers Meadow and Fen Close catchment areas with Fen Close identified as a high risk location, where drainage along the field within the Redrow site appears to be along a subsurface drainage channel also visible in arial photos, such as Google Map, performing a similar function to the Shenfield watercourse at the other end of the proposed development site
- Drainage from the upper Officers Meadow and Fen Close catchment areas is likely to become impacted not only by the development within the Redrow site, but also by the proposal to locate a subsurface attenuation tank across the current drainage channel, which is likely to increase the risk of flooding in this part of the proposed development site and across existing dwellings within Fen Close and the nearby Chelmsford Road neighbourhood
- As for the proposed developments along the Shenfield watercourse, an assessment of the proposed development within the upper Officers Meadow area and the Redrow site would be necessary to deliver a joint-up drainage and flood risk strategy where surface runoff discharge from the proposed Croudace development would potentially continue via a modified runoff attenuation system into the Shenfield watercourse while water infiltrating the ground across the upper Officers Meadow, Fen Close and Chelmsford Road neighbourhood areas will continue to flow across the ancient woodland and along the Redrow site to the river Wid

Suitability of SuDS for management of surface water runoff within the proposed development site

The proposed development makes use of a SuDS for management and mitigation of the surface runoff generated from across the site, in particular a series interconnect surface and/or subsurface attenuation tanks are proposed lining the upper Officers Meadow area to the Shenfield watercourse via a network of internal drainage pipes. The surface runoff simulation modelling carried out in relation to the Drainage and Flood Risk Assessment report states that the SuDS are only expected to fill up twice a year. But the report lacks detail on the specific SuDS design and dimensioning of subsurface structures and these details are also more likely to require further detailed investigations

- The report mentions that a number of the subsurface attenuation tanks are required to be installed below a shallow water table found within the proposed development site with an

associated need to secure the attenuation tanks and interconnect drain pipes against groundwater ingress where any failure to achieve this makes the SuDS structure unusable for its intended purpose and may require design amendments as local conditions become known during the construction phase with associated increase in cost, and a cost is associated with managing the filtration of silts and sediments from the inflow to the tanks and with ongoing monitoring, cleaning and maintenance of the tanks. It is also unclear if the operation of the attenuation tanks will require the installation of pumps to move water across part or all of the interconnected network of tanks towards the outlet, again adding cost for installation, maintenance and operation, and this becomes another potential point of failure that could prevent the SuDS from performing in accordance with design their specification when otherwise required to handle storm discharge. Consideration must be given to how potentially high maintenance costs are covered either from residents within the development or via the general Council budget, where there is a risk that the affordable housing provision within the proposed development will no longer be affordable by the intended target

- According to The SuDS Manual issued by CIRIA on behalf of the Department for Environment Food and Rural Affairs, the best efficiencies of SuDS is achieved when these are constructed within well-drained soils and at sufficient height above an underlying water table to support free drainage from the SuDS structure. Issues relating to the use of SuDS within a floodplain and areas where the SuDS must be constructed below the water table identified within the same document include lateral load stresses from groundwater on the sides of a subsurface storage tank and the associated buoyancy that may result in uplift and ultimate failure of the system, and this may limit the size of subsurface structure that can be accommodated in such environments
- The potential impacts of the proposed installation of a subsurface attenuation tank in currently saturated soils within the main surface water drainage channel from the upper Officers Meadow and Fen Close areas were discussed above and the potential for groundwater-related impacts at this location cannot be dismissed. Equally, the proposal to install further subsurface attenuation tanks by the railway line at the northeastern corner of the proposed development site needs careful consideration as the soils in this location are also subject to seasonal flooding. This location is set within what appears to be a man-made depression extending from the railway line along the ancient woodland towards the northern corner of the site. While I am not aware of the reason for the existence of this depression it would be natural to assume that this has been created to promote groundwater upwelling along the railway line and runoff along the Shenfield watercourse to mitigate flood risk in the Long Riding area identified with the EA maps arising from surface and subsurface runoff from Hutton Poplar and Woodman Avenue neighbourhoods on the other side of the railway line, where construction of the railway line would have created an obstruction to naturally occurring runoff into the Shenfield watercourse with the man-made depression already providing attenuation storage for slow release of surface runoff along the Shenfield Watercourse from areas outside the proposed development site
- While the proposed use of SuDS for runoff management within the proposed development site may appear conceptually attractive the observations above highlight a number of potential issues that need to be understood and potential impacts on the areas outside the site will require further investigation

The proposed development site straddles the boundary of the Shenfield CDA (critical drainage area) and a small sub-catchment extending from upper area of the site across the ancient woodland and the adjoining field subject to a similar development proposal from Redrow into the River Wid. The proposed development site serves as an important floodplain for retention of surface water draining from the Shenfield CDA along the Shenfield watercourse (as described in the submitted Drainage and Flood Risk Assessment report) across the downstream exit from the proposed development site via Chainbridge watercourse into the river Wid.

In accordance with the findings of the flood risk assessment development is proposed predominantly to consist of more densely built housing across the upper area of the site away from the Shenfield watercourse except for a smaller area between the Shenfield watercourse and Alexander Lane to the south where flood risk is deemed acceptable subject to passing exception criteria against simulated storm flows for the Shenfield CDA.

The Drainage and Flood Risk Assessment report fails to recognise that the upper part of the proposed development site is located outside the Shenfield CDA, and additional flood risks from groundwater is also dismissed based on observation of a shallow confined aquifer at a depth of 3-4 m below ground level. However, current runoff resulting from rainfall across the area proposed for development occurs predominantly as subsurface runoff within the unsaturated zone except for rain falling directly or in the immediate vicinity of the Shenfield watercourse where localised saturated pockets of groundwater is likely to occur along preferential flow paths at different depths commonly occurring in similar floodplain environments (e.g., [Vertical surface water-groundwater exchange processes within a headwater floodplain induced by experimental floods \(weebly.com\)](https://www.weebly.com/vertical-surface-water-groundwater-exchange-processes-within-a-headwater-floodplain-induced-by-experimental-floods)). And different areas across the proposed development site are observed to become seasonally saturated following prolonged or heavy rainfall events

The northeastern corner of the proposed development site is one of these areas. This location appears to form the main outlet for natural subsurface drainage from the upper part of the of the proposed development site, and is also thought to be an important drainage outlet from Fen Close and the immediate Chelmsford Road neighbourhood, identified as a high or moderate surface flood risk areas in the EA flood risk map reproduced as Figure 2 in the report and also available as an interactive map from Essex County Council ([Check if you're at risk of flooding \(essex.gov.uk\)](https://www.essex.gov.uk/check-if-youre-at-risk-of-flooding)).

The role of drainage from the upper part of the proposed development site and potential impacts from the proposed Croudace and adjoining Redrow developments need to be better understood. And this should ideally be address via a joint Drainage and Flood Risk Assessment across all sites proposed for development within the wider R03 development area.

The eastern corner of the proposed development site towards the railway line is also subject to seasonal subsurface saturation and a permanent pond is also located within what appears to be a man-made depression along the ancient woodland. Subsurface saturation at this location is likely to be connected to the floodplain retention storage for the upstream discharge from the Shenfield CDA into the Shenfield watercourse evidenced within the small wooded area immediately to the south along the railway line and outside the boundary of the proposed development site. Also, it cannot be excluded that subsurface flows from an area that forms a depression within the proposed Redrow development site and from the Woodman Avenue and Long Riding neighbourhoods to the east of the railway line all of which are located within the natural catchment for the floodplain drained by the Shenfield watercourse.

The Long Riding and White Gates neighbourhoods are also identified as high risk areas for surface water flowing in the EA Surface Water Flood Risk map. It would therefore seem appropriate if a more detailed study is conducted to establish the flood risks outside the area of the proposed development site at this location before permission is granted.

The general SuDS design proposed for the development appears to adhere to the main guidelines for use of SuDS within a floodplain environment. However, the location of a subsurface attenuation tank at the main outlet for subsurface drainage from the upper part of the proposed development site is likely to restrict naturally occurring subsurface drainage across the ancient woodland and into the proposed Redrow development site. And the impact of seasonal subsurface saturation on the attenuation tank itself may require careful design considerations at this location and the location along the railway line. The proposed design also suggests that a portion of the drain pipes connecting the upper attenuation tank with the attenuation tank located along the railway line is located below the mean water level of the lower attenuation tank raising questions regarding the efficiency of the proposed drainage design.

From the design criteria published by Anglian Water in their SuDS design manual ([aw_suds_manual_aw_fp_web.pdf \(anglianwater.co.uk\)](#)) it is suggested that “the drainage designer will demonstrate that the development, including the SUDS system, is outside the functional floodplain and, wherever possible, outside the 1 in 100 (or 1 in 200) year flood risk zone”. The CIRIA SuDS Manual ([49357_ciriareportc753thesudsmanualv5.comp.pdf](#)) used as reference for the proposed design also cites challenges relating to the use of SuDS within a floodplain or areas where the SuDS must be constructed below a water table, such as lateral load stresses from groundwater acting on the sides of a subsurface storage tank and the associated buoyancy that may result in uplift and ultimate failure of the system.

Given that the area along the railway line appears to act in connection with the main floodplain along the Shenfield watercourse the proposed SuDS design will require further assessment.

The Anglian Water SuDS design manual also recommends that surface water runoff from impermeable ground areas is collected separately from ‘clean’ runoff from roof areas and cleaned as it travels towards the watercourse. It is unclear to what extent this is accommodated within the proposed SuDS design, and a more detailed design review may be required to bring this from the concept stage into implementation.

It is also relevant to consider the cost of maintenance of the proposed SuDS design and how this may be covered either via ground rents for residents within the proposed development area or via the general Council budget, as this could otherwise impact the affordability for the intended target of the affordable housing provision within the proposed development.

The impact on the general water balance in relation to the density of development proposed along the ancient woodland fall outside of the obligations for drainage and flood risk assessment, but this should ideally be considered from an biodiversity and woodland management perspective. From the Drainage and Flood Risk report it can be seen that drainage from about 60% of the proposed development site will be converted to surface runoff and discharged to the Shenfield watercourse via the proposed SuDS. This portion of runoff will therefore not contribute to subsurface infiltration unless this is accommodated within the proposed SuDS design.

In the absence of information on subsurface flows, it is difficult to assess the potential impacts of a change in the water management regime arising from the proposed dense development along the ancient woodland and the potential impacts on the long-term sustainability of the woodland if this is

dependent on the existing subsurface flows from the adjoining field intercepting the root zone. It may therefore be necessary to carry out further investigations to confirm the level of development that can be accommodated along the woodland area to determine the subsurface flows across the ancient woodland between the proposed Croudace and Redrow development sites.

As a naturally occurring floodplain interacting with the ancient woodland the proposed development site already supports a range of different habitats, typical of such environment, where currently badgers, foxes and rabbits occupy burrows in the woodland and in the smaller wooded area along the railway line immediately outside the proposed development site. Existing ponds within the site also support a range on invertebrates, including newts, that also benefit from seasonally inundation at other locations across the site as they forage for food across the field and into the gardens along Chelmsford Road and Fen Close. The permanent and seasonal ponds also provide an important breeding ground for mosquitos and other insects that enter the food chain for birds and bats that are often seen hunting at dusk across the field and gardens along Chelmsford Road. Within the drier parts of the field ground dwelling bees and wasps, as important pollinators otherwise in decline, are also found nesting in the scrubbed areas backing onto the gardens of Chelmsford Road and Fen Close, where slow worm populations are also found in many locations.

While the Biodiversity Net-gain report makes provisions for the introduction of vegetation in relation to the proposed SuDS development within the site, this will requires up to 3 years to establish from when the development is completed, and the impact on fauna is explicitly ruled out of scope for the report. Similarly, the Woodland Management report makes provisions for establishing future habitats for animals. However, impacts on existing wildlife during and after development has not been addressed, either in terms of relocation or obliteration. And there is no clear provision for how this would be re-established once the proposed development is complete.

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