CPRE Oxfordshire
20 High Street
Watlington
Oxfordshire OX49 5PY

Telephone 01491 612079
campaign@cpreoxon.org.uk

www.cpreoxon.org.uk

TECHNICAL BULLETIN

Watch Points for Drainage Aspect of Planning Applications

CPRE Oxfordshire is concerned that the impact of new development on existing drainage services, both surface water and foul drainage, is currently overlooked within the planning system. This puts strain on local drainage strategies with local rivers bearing the brunt. Ultimately surface water finds its way to local streams and rivers potentially causing flooding. In the event that mains sewers are unable to cope with foul drainage, water companies are permitted to release untreated sewage into rivers potentially causing significant environmental damage.

The statutory consultees (such as the County Council, the Environment Agency or the local water authority) may not have sufficient time or suitably qualified resources to scrutinise and evaluate the information submitted in any detail. They may instead rely on the consultant's professional indemnity and of course the consultant will be engaged by the Applicant. Your district council will rely on responses from the statutory consultees and if they do not comment or object, the district council will have no grounds to condition or refuse the application.

On the other hand, you have the local knowledge and will be in a position to challenge some of the assumptions and conclusions and you can let the statutory consultees know about material facts. Your information will help them judge the validity of the Applicant's information.

Although drainage is a technical subject, engineering is far from an exact science. Data can be interpreted to suit a preferred argument. In fact, drainage design in particular is relatively imprecise, compared to say the structural design of a building. This is because the ground conditions are a particularly unpredictable variable in the UK, even across relatively short distances. Equally, assumptions can be conservative or optimistic and inconvenient data may be omitted.

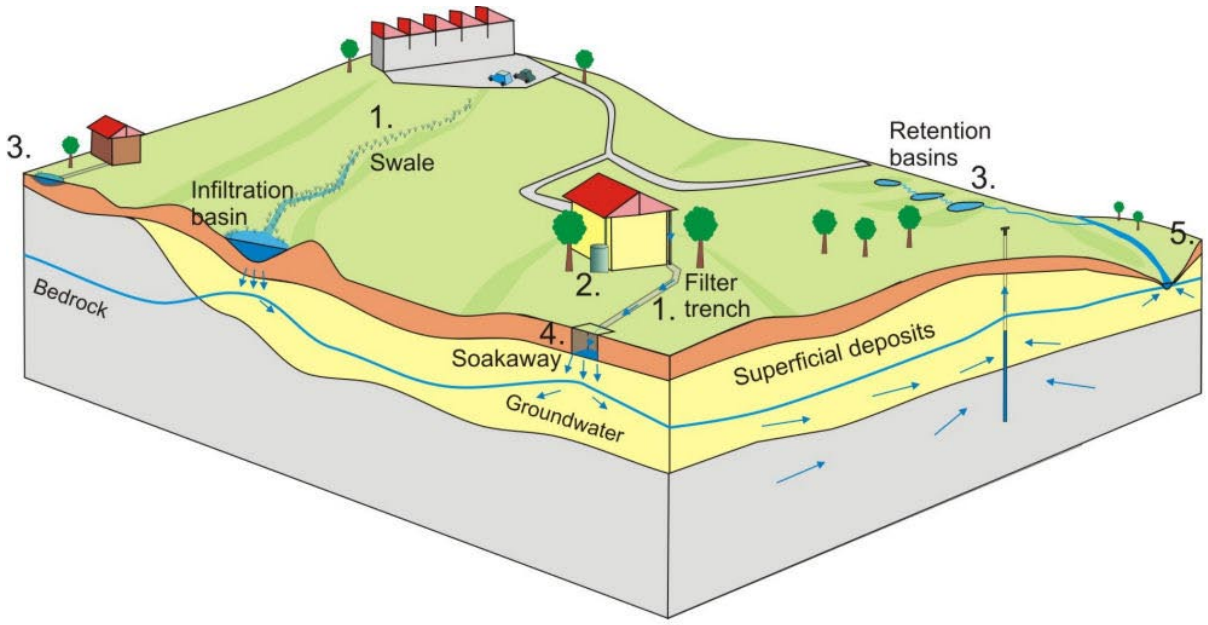
Some watch points below, should help you check the drainage information that accompanies a planning application.

Geotechnical Investigation or GI (A Sample Study of the Ground Conditions)

- Aside from assessing the strength of the ground for construction of buildings, this is often used to assess the porosity for absorption of rain water run-off as part of the drainage design. Once the amount of water absorbed has been calculated, the increased run-off as a result of the development can be calculated. If the ground is porous/permeable, then it may be concluded by the Applicant that even if some of the land is covered in hard surfaces, such as concrete or tarmac, there will no increase in run-off or if not, a small or manageable increase. Generally granular material like sand or gravel is more porous than cohesive soils like clays – the coarser the better, as the voids make space for water. Rock can be porous if fissured, but equally it can be a coarser barrier with water running along it or pooling on the surface.

- Sometimes at application stage, no GI is done and the Applicant makes an assumption to assess increased run-off. For example, the Applicant may conclude that if the site is not in a flood zone there will not be a problem- this would be a point to raise, especially as the Environment Agency flood zone maps aren't necessarily up to date. You may be aware and have evidence of local flooding that would invalidate the assumption made by the Applicant. At the very least a planning condition would be needed to ensure further work is done before construction could start.
- Sometimes at application stage, the Applicant relies on historical GI that is close to the site, this would be a point to raise, as it would not necessarily be representative and again a planning condition would be wise.
- Sometimes the GI is done at a time in the year when the water table is low and there has been little rainfall, so the ground is dry with voids filled with air and not water. It will appear therefore that the ground is more porous than it will be when it really counts ie) the wet season. Seasonal changes need to be considered. You may be aware for example that the ground is saturated at certain times of the year (as evidenced by surface pooling, with slow dissipation), which means in reality that it has no spare capacity for increased run-off.
- Sometimes, the GI takes the form of trial pits, which are shallow digs and assumptions are made about the ground below. If that includes assuming that the bedrock is permeable, this may be incorrect and may lead to saturation and run-off into rivers. You may want to query whether the trial pits are adequate and whether enough have been carried out to be representative of the site.
- Even if the Applicant has carried out deep boreholes (essentially core samples of the ground to depth), there may not be enough taken to represent the ground conditions across a large site. You may know that there are localised changes, which you can highlight.
- Sometimes soakage tests are carried out to establish porosity. This is a crude test, which involves filling a pit with water and measuring how long it takes to dissipate. If these tests are carried out in the summer, the results are likely to be more favourable (unless done when the ground is baked dry). Equally, if they are done on higher ground, the effects of ground water that may be present at lower points across the site may not be properly accounted for in the design.
- When SUDS (sustainable drainage systems like filter drains, swales etc.) are used, the prudent design protocol is to assume the base of the drain is non-porous in assessing the drain size, because it will probably silt up over time.

Schematic diagram of the subsurface beneath a soakaway system



During a storm event, surface water flows through swales and filter trenches that remove entrained pollutants (1). The peak river discharge is delayed and reduced by; storage of water for re-use (2), storage in ponds (3), or infiltration of water to the ground through infiltration basins and soakaways (4). This process improves the quality of water in rivers and decreases peak river discharge (5).


Infiltration basin

Leonhard Lenz/wikimedia commons

Therefore, the sides of the trench only are used in assessing the capacity of the drain. CPRE has observed a case where the soakage test calculation was done in this way: the effect of the base of the excavation was ignored. A fresh excavation cannot be silted up, so the base of the excavation, which will be a high proportion of the area of soil in contact to the ground, will be contributing greatly to the absorption of the water. Assuming the base of the excavation isn't active will falsely elevate the calculated porosity, as it implies a much smaller area of ground is absorbing a given volume of water in a given time. In this case, the incorrect calculation led to a conclusion that the development would reduce run-off, which was pretty obviously false for a scheme to build a large number of houses on green space.

- CPRE has also observed a case where a soakage test was carried out in an area where there was a void in the ground, so the water absorbed rapidly and the theoretical porosity was extremely high. Soakage test results are often averaged and if only a few are carried out, one taken at a void will skew the results greatly. A result like this should be discounted as it is an outlier and is unrepresentative.

Surface Water Drainage

- The surface water drainage strategy might be to use mains sewers. In that case, the water authority will comment on capacity for the run off calculated by the Applicant (which may be underestimated for all the reasons above). However, it may be necessary to consider cumulative impact in conjunction with other proposed developments.
- Ultimately, this surface water will end up in rivers and it may be necessary to consider areas of flooding both up and downstream of the site across quite a wide area. Bear in mind that without the development, the surface water may find its way into the river anyway, but via the ground, at a much slower rate and spread over a larger distance, rather than discharging at speed from set out-feed locations. Also, the run-off will be more, as with land drainage the ground provides natural storage capacity and some of the water may find a path to a location deep in the ground.
- The surface water drainage may be via absorption into the ground using sustainable drainage systems or SUDS. With the loss of green space, this is likely to include some on-site storage in infiltration trenches, filter drains, swales and attenuation ponds, which slow down the rate of discharge into the watercourses or rivers. Sometimes, permeable paving is used, but that still won't drain as quickly as green space or make up for areas concreted over. Once again the run off ultimately ends up in rivers, so overall capacity needs to be checked and all the points made about location and speed of discharge plus relative volume require consideration.
- SUDS are often placed at the lowest points on a site as that is naturally where water collects, but often that ground is saturated in the wet season anyway. Applicants often assume that in assessing the size of an attenuation pond, they can simply calculate the volume of soil (including voids) removed and compare it with the run-off that needs to be accommodated. If that soil is at times saturated ie) all voids filled with water, then the Applicant should only

compare the soil volume less voids with the run-off volume. This could mean that the pond needs to be twice as large.

- Generally, attenuation ponds are shallow, with sloping banks, as they look better than deep ponds, with steep reinforced concrete sides. The latter is more efficient in terms of land take, but expensive to build and has to be contained with restricted access for safety reasons. However, even the shallow ponds could also present safety issues. Also, they attract wading birds, which can increase bird-strike risk near airports. Your local airport if close may need to comment on the application. If it's an RAF base, the authority would be the Defence Infrastructure Organisation (DIO), but they only usually comment on detailed applications, so it's good to make the point about the potential risk early.
- With a SUD based scheme, there could be maintenance issues. SUDS are relatively new and the long term performance isn't well understood – for example, will permeable paving still be working in 10 years or will it have silted up? Who will check for schemes silting up? Who will pay for repairs?
- SUDS like attenuation ponds could be an eyesore when empty in the dry season, and may need clearing out.

Foul Drainage

- The foul drainage strategy may be to use the mains sewers. In that case a capacity check is needed and the water authority will be a statutory consultee and will check capacity. However, as with surface water drainage, the cumulative effect of a number of developments needs to be considered.
- Even more crucially, many sewers are combined with surface water or, if not, surface water finds its way in via manhole covers in times of flooding. This can increase the volume of liquid in the sewers massively. When this happens, the local pumping station or ultimately the sewage treatment works can become overloaded and discharge untreated sewage into the river. This is acknowledged as an event that can occur in extreme situations, but it is becoming unacceptably common. It's very damaging to the environment. If you are aware that this has happened local to the development, you can raise it.
- There may be an element of on-site sewage treatment, either via a sewage treatment works or reed beds. With a sewage treatment works, the effluent has to go somewhere and should be added to any run-off in the flood risk assessment.
- Reed beds are only suitable for liquids, and solids need to be containerised or dealt with via the mains. With reed beds, the liquid will need to find its way to a watercourse or river, although at a slower rate than a sewage treatment works, but nevertheless, it can be a factor for flooding.
- Reed beds are often located at the lowest part of the site, as that avoids or limits the need for pumping stations. Sewage is collected up via drains and gravity helps it on its way to the reed bed, once solids are separated. However, as with attenuation ponds, reed beds are not effective in saturated ground and low points are often where seasonal saturation occurs or the water table is high. Remember that geotechnical investigations may not highlight saturation if carried out at the wrong time of year.

The information provided in this technical briefing is correct to the best of our knowledge however CPRE Oxfordshire would always recommend seeking professional advice.

CPRE Oxfordshire works to improve, protect and preserve the landscape of Oxfordshire and its towns and villages for the benefit of everyone.

Visit our website to find out more and get involved *www.cpreoxon.org.uk*