To clarify the outstanding drainage problems in some detail, this document attempts to break them down into smaller components. However, it is important to note that many of them are closely inter-related and will "work" together to create or exacerbate undesirable drainage consequences, particularly in storm conditions. The specific problems are:

- **The Open Water Channel, which runs across the site is not a suitable discharge point for additional land drainage or exceedance flows.** This is because of the hydraulic and structural inadequacies in the downstream flow routes, as well as serious questions about the legal status of the channel and downstream pipework. There is a very high probability that the currently proposed use of this channel, as a focused water discharge point, will lead to repeated flooding of Far Lower Wood Farm and several properties fronting onto Manchester Road (primarily numbers 42 to 64). The developer and Council planners are aware of this risk and have proposed a crude side-spill overflow arrangement just before the channel enters the garden of Far Lower Wood Farm. However, it is very unlikely that this overflow will be sufficient to prevent flooding. On the contrary, our view is that it will exacerbate flooding in the existing and new properties on both sides of the northern boundary of the site. Our reasons for saying this are covered in the following bullet point concerning the overflow itself. Perhaps the most fundamental mistake the developers and the Council planners have made is to assume that the open water channel is a natural watercourse or drainage ditch, whereas it is emphatically NOT a natural watercourse and it is NOT a drainage ditch. It is a man-made open water channel which was originally constructed perhaps 120 years ago to convey water supply to the farm and its associated dairy. As a man-made private water supply channel, it is not subject to the usual laws, rights and obligations of natural watercourses and riparian ownership. This fundamental mistake leads to several other consequential errors in drainage design, particularly how the "water channel" can and should be integrated with other drainage networks on the site, particularly the land drainage network and identifiable exceedance flow routes. We understand that in the early days of the planning process, the developer promised the owners of Far Lower Wood Farm that no additional water / drainage would be discharged to the open water channel. Unfortunately, that promise has not been honoured in the existing planning proposals. Significant land drainage flows and "exceedance" flows have been added to the open water channel and will significantly increase the risk, frequency and severity of flooding of Far Lower Wood Farm and existing nearby properties.
- **The concrete side-spill overflow on the open water channel is very crude and will do little to mitigate the frequency and severity of flooding of downstream properties.** To be effective, side-spill overflows need to be situated on well maintained, steady flow / laminar flow channels. They are not appropriate for turbulent, variable flow conditions on poorly designed and maintained water channels subject to siltation. The channels need to have a properly designed control device, such as a penstock, on the main throughflow channel. In most cases they will also incorporate full cross section, concrete linings upstream and downstream of the overflow itself. (to inhibit siltation and ensure laminar flow). In the current inadequate proposals, the side-spill concrete overflow weir would be situated on a lowered earth banking (which may be subject to erosion), on a water channel which has highly variable flow characteristics. This is because of the propensity to siltation / erosion and its use as a land drainage and exceedance flow channel. We are also deeply sceptical about future maintenance of the earth channel and overflow structure, by the proposed "site management

company", especially in such a safety and flood critical position. In our view the proposed overflow will do little to prevent flooding of downstream properties and is little more than non-professional "window dressing". As such it is not acceptable.

- **Disposal of the land drainage from the site.** The proposals show that an estimated 80% plus of the land drainage from the site will be discharged into the open water supply channel that runs through the site and hence through the curtilage of Far Lower Wood Farm. or via the overspill weir to the land drainage pipework on the Northern boundary of the site. The remaining (up to 20%) land drainage is also connected to the same land drainage pipework along the Northern boundary of the site. We say that the open water channel is a totally unsatisfactory point of discharge for such a relatively high volume of land drainage. It is also an unsatisfactory point of discharge for the exceedance flows from the site. This is because of:
    - Questions about the legal status of the open water channel and legally challengeable rights of discharge to it (remember it is NOT a watercourse – it is a private water supply channel)
    - Structural and hydraulic inadequacies in the downstream culverts & pipework through the curtilage of Far Lower Wood Farm, with propensity for flooding of Far Lower Wood Farm and multiple properties on Manchester Road
    - Fundamental design inadequacies in the overflow structure and downstream land drainage pipework through the gardens of plot numbers 1 to 8 of the new development. These design inadequacies will also lead to propensity of flooding of Far Lower Wood Farm and multiple properties on Manchester Road. The fundamental design inadequacies include a poorly conceived and designed overflow structure & collection basin, possible overground routing of overspill water through the garden of plot number 8 (various submitted plans show different options), wholly inappropriate use of inverted soakaway manholes on steeply sloping generally impervious ground and the completely inadequate sizing of the land drainage pipework on the northern boundary of the site.

  We have to stress, in the strongest possible terms, that the open water channel is NOT a drainage ditch and it is NOT a natural watercourse. It is a man-made water supply channel. Failing to recognise the legal status and technical limitations of this open water channel is possibly the greatest error that the developers and Council have made and it has led to some serious consequential errors in the drainage design. It must also be remembered that, although some field drainage already discharges into the open water channel, the new, more extensive land drainage system is likely to increase the total volume discharged and, more significantly, reduce the time of concentration and increase the "peak flow rate" during storm conditions. It is virtually certain that this will lead to flooding of properties on both sides of the boundary along the Northern edge of the site.

- **Inappropriate configuration of the open water channel and integration with the land drainage system.** As noted in the previous point, an estimated 80% plus of flow from the land drainage system will discharge into the open water channel which is an unsatisfactory and unacceptable point of discharge, because of downstream hydraulic and structural inadequacies. However, the open water channel is only approximately 50 metres long and its configuration is also rather bizarre. There are two 450mm diameter pipes feeding into the channel at the Western end and one 225mm and one 150mm diameter pipe at the other end. The 225mm pipe and 150mm pipe combine, before

feeding into the open channel directly opposite the proposed concrete overflow weir, thus completely negating any hydraulic viability the overflow might have had. It also seems utterly bizarre to discharge any of the four land drainage connections into the open channel so close to the proposed overflow weir, which effectively means that flow is being removed from the channel almost as soon as it has been added. This is crazy. and the overflow has a virtual zero chance of working properly with this inflow / outflow configuration. Quite simply the drainage designers are not thinking how this system will operate in storm conditions. This leads to a totally ridiculous, ineffective design of the channel and the side-spill overflow.

- **Inappropriate integration between the exceedance flow system, the open water channel and the land drainage system.** Quite apart from the problematic and inappropriate integration between the open water channel and the land drainage system, the drainage designers have (inadvertently?) exacerbated the situation by directing "exceedance flows" down to a low point in the highway to the West of house plot number 9, and hence to the open water channel running through the site. This is really very bad and unthinking drainage design, given that the downstream conduits through the curtilage of Far Lower Wood Farm are not capable of taking any increased flow and the proposed "overflow" system on the water channel is also crude and unworkable. It is not rocket science to see that the added exceedance and land drainage flows will overwhelm the open water channel and the downstream conduits. Quite simply SUDS (Sustainable Urban Drainage System) guidelines say that exceedance flows must be taken to a point where they can be disposed of safely and effectively. That is NOT the case with the current proposals. *NB: For the benefit of clarity, we note that the term "exceedance flows" means all exceptional and unexpected flows which might arise, because of exceptional rainfall conditions, blockages in the designed drainage networks or any other circumstances where surface water run-off exceeds normal design parameters. In most circumstances the provision of exceedance flow routes involves the overland diversion of excess flows to a point of safe storage or disposal, rather than installation of additional pipework. In effect, "exceedance flow routes" are the last resort to prevent flooding of properties and they do not end at the site boundary. It is just as important to protect existing off-site properties. Developers cannot simply discharge exceedance flows over the site boundary and disregard the consequences.* They have to provide exceedance flow routes through to a point of safe disposal. Regrettably it seems that the developer and the Council drainage technicians do not understand this requirement.
- **Inadequate provision for "exceedance flow" from the storm water storage tank and associated hydro-brake control structure.** As far as we can see, the proposals do not incorporate ANY provisions for dealing with "exceedance flows" from the storm water storage tank or its associated Hydro-Brake control arrangement. There is certainly no identifiable exceedance flow route down to Manchester Road. It is possible that some exceedance flow would flow from West to East back along the highway surface before discharge to the open water channel running through the site. We have shown in previous points that this is an unsatisfactory and unsafe point of discharge. However, we think it more likely that exceedance flows from the storm water storage tank will flow in an uncontrolled manner through the gardens (and perhaps the interior) of house plot number one. Alternatively, the exceedance flows may escape through the manhole covers on the water storage tank and flow in an uncontrolled manner down the steep hillside towards Manchester Road. It is likely that this will cause erosion of the steep

hillside and / or structural damage to the foul and surface water drainage infrastructure. This is simply not acceptable.

- **Inappropriate siting of the storm water storage tank.** We have pointed out, many times over, that the storm water storage tank will require flat vehicular access for maintenance purposes. We cannot understand why the developer and the Council drainage technicians have ignored this basic and fundamental requirement, by siting the storage tank on a steeply sloping Pennine hillside and maintaining the steep slope above the tank roof.. Further arguments regarding this problem will be provided on request. NB: If there are any residual problems with the storm water storage tank it is likely that this will lead to adoption problems and in turn to the ongoing responsibility falling on the proposed site management company. The potential costs and legal responsibilities of this are not insignificant and may cause problems with mortgages and house ownership. It is therefore essential that the potential problems with the storm water storage tank are resolved BEFORE the planning conditions are discharged.

Solutions

We believe that there are relatively simple solutions to these problems. In very simple terms these include

- AVOID USING THE OPEN WATER CHANNEL AS THE PRIMARY LAND DRAINAGE AND EXCEEDANCE FLOW DISPOSAL POINT
- Reverting the open water channel mainly to its original “water supply” function
- Removing excess / additional land drainage from the open water channel
- Redesigning the land drainage system in the North-West quadrant of the site, to take most of the land drainage flow from the whole site directly down to Manchester Road
- Re-siting / redesigning the storm water storage tank, to provide hard level access for motor vehicles.
- Creating an identifiable and secure exceedance flow route down to Manchester Road from the storm water storage tank and its associated control structure.
- Removing ALL exceedance flows from the open water channel running through the site. This can be done by slightly reprofiling the site road to create a continuous gradient down to a low point in the hammerhead at the Western end of the site. An identifiable exceedance flow route could then be created directly down to Manchester Road from the highway hammerhead. This would also serve as an exceedance flow route for the storm water storage tank.

Exceedance flow routes shown on plan at https://www.kirklees.gov.uk/beta/planning-applications/search-for-planning-applications/filedownload.aspx?application_number=2023/93464&file_reference=1021690

Lan drainage and water storage tank shown on plan at https://www.kirklees.gov.uk/beta/planning-applications/search-for-planning-applications/filedownload.aspx?application_number=2023/93464&file_reference=1021691