

We do not recommend discharge of conditions at this time. Following our previous correspondence one of our engineers has now visited the site and observed the in-situ drainage. Our inspection has confirmed the following:

- The as-built drawing supplied by the client and used by Odyssey is inaccurate and is not representative of the drainage that has been constructed.
- The Odyssey report is based on this inaccurate drawing and as a result, the conclusions cannot be relied upon.
- There is now evidence that the drainage system has not been remediated by the contractor, as was previously suggested to be the case.
- The contractor previously confirmed to Odyssey (as stated in section 2.6.1) that all drainage runs were installed as per approved design drawings. This has now been confirmed as untrue and invalidates the conclusions of Odyssey's report.
- The quality of the workmanship for many of the components is inadequate and must be remediated.
- Some of the changes made since the approved design have the potential to increase the risk of flooding onsite and severely impact the functionality of the drainage system.

The following will be required before we can discharge the condition:

- 1) A full survey of the in-situ drainage will need to be carried out to identify all deviations from the original approved plans.
 - This must include all elements of the drainage system including pipes manholes, SuDS, sediment traps etc.
- 2) A revised as-built drawing including all elements of the drainage system must be provided. This drawing must be based on the full survey discussed above. Pipework was previously excluded from the as-built. The as-built drawing previously submitted is incomplete (missing pipe information) and contains errors compared to the in-situ drainage, confirmed by our engineers visit to the site. The current as-built is therefore considered unreliable evidence and a replacement drawing based on surveys of the installed drainage must be provided.
- 3) Any construction defects in the drainage system that are identified from surveys will need to be remediated, this may include full replacement of improperly installed SuDS. Documented evidence of this remediation must be provided in the form of follow up surveys and photographs, and a revised as-built drawing after remediation. Each element of the drainage system that requires remediation must be considered and evidence of the remediation documented either via verifiable sources (e.g. photographs, surveys etc), or by a 3rd party independent verifier.
- 4) It is clear the contractor has not constructed the scheme as designed and there are significant deviations from the approved plans. Odyssey or another verifier must confirm all elements of the drainage system, not just the SuDS, to ensure the pipework, manholes, levels, and all other elements of the drainage system are properly installed and in accordance with the original design.
- 5) A revised drainage model and verification report will need to be commissioned, which should consider the changes identified by the new survey and all of the remediation works

undertaken. Should the new drainage model show any part of the drainage is now inadequate, the drainage will need replacing, to ensure that the inadequate parts of the drainage system are made good. This drainage model must not be based on assumptions that any part of the drainage is installed correctly. This model must include all pipes, manholes, SuDS and other drainage features.

Detailed comments relating to the elements of the scheme that have been investigated by our engineers have been provided below. These construction issues and variations from the approved design must be remediated:

1. Permeable pavement west of plot 23;
 - a) Photographs show manholes within the paving system with 150mm diameter pipes. These pipes are assumed to be perforated.
 - b) The construction photographs show granular trenches constructed between pockets of crates. This does not match any of the approved construction details. This paving system will need to be replaced with one that follows the design drawings, or new design drawings with the revised design matching the installed system (which must also be in accordance with all relevant British Standards) submitted and approved as an amendment to the original planning consent.
 - c) Manholes within the permeable paving system are of poor quality and must be remediated, i.e. holes cut through walls to accommodate pipes. If to be retained, they will need cleaning out and making good around pipes with mortar or a suitable sealant.
2. Manhole S72 (inlet to infiltration tank west of plot 33);
 - a) This manhole is specified as silt trap with 300mm sump. The silt trap that has been constructed is of an unconventional design and does not appear to be 300mm deep as originally designed. This silt trap will need remediation.
 - b) The twin incoming pipes to MH S72 have been constructed as 150mm diameter pipes, as opposed to 225mm diameter. This will impact the capacity of the surface water drainage system to convey runoff. As Odyssey has not remodelled the pipework, it is possible this change could result in flooding of properties unless remediated or remodelled to confirm it does not cause flooding.
 - c) The outlet from MH S72 is a single 150mm diameter pipe, Drawing Yap-130-082 shows this should have been two no. 225mm diameter outlets, connecting into the inspection channels (which are also not present). As Odyssey has not remodelled the pipework it is possible this change could result in flooding of properties unless remediated or remodelled to confirm it does not. We also have concerns about the impact this may have on siltation, and air locking of the soakaway during high flows, as there is no vent system in place.
 - d) The outlet to MH S74 does not exist and hence MH S74 does not exist either.
3. Infiltration tank west of Plot 33;
 - a) The proposed access manholes to provide a means of inspection into the crates do not appear to exist. Inspection manholes must be constructed, and an inspection of the crates carried out to verify they have been built as designed.
4. Manhole S70 (west of plot 33);

- a) The outgoing pipes are twin 150mm diameter pipes as opposed to the original design (225mm diameter). As Odyssey has not remodelled the pipework, it is possible this change could result in flooding of properties unless remediated or remodelled to confirm it does not.
 - b) The incoming pipe from the north is 150mm in diameter, as opposed to the design (225mm diameter). As Odyssey has not remodelled the pipework, it is possible this change could result in flooding of properties unless remediated or remodelled to confirm it does not.
5. Manhole S69 (adj. to plot 20);
- a) A 150mm diameter outlet has been installed, as opposed to the design (225mm diameter pipe). As Odyssey has not remodelled the pipework, it is possible this change could result in flooding of properties unless remediated or remodelled to confirm it does not.
 - b) A 100mm diameter inlet has been installed (incoming from west) as opposed to the 150mm diameter proposed. As Odyssey has not remodelled the pipework, it is possible this change could result in flooding of properties unless remediated or remodelled to confirm it does not.
 - c) Benching of this manhole is not finished and mortar droppings need cleaning out.
 - d) The cover slab is not aligned with rectangular precast sections. This will need to be made good with pointing, with mortar between the slab and sections. If it is discovered through surveys that this misalignment is due to settlement and not simply poor installation, a full replacement of this manhole will need to be carried out.
6. Manhole S73 is located in a different location to that shown on the design plans. A survey of this manhole will need to be carried out.
7. Manhole S65 (adjacent to plot 36);
- a) This manhole is located within the permeable paving, as opposed to the location shown on the plans. If it is to remain in this location, confirmation that the volume of storage within the paving lost to this manhole will be required.
 - b) This manhole is a poor quality installation, mortar droppings need cleaning out and the surface made good.
8. The installed permeable paving system uses a product called GEOLight (as denoted in Odyssey's verification report). Photographs of the installation of the permeable paving system do not match the design drawings for GEOLight, available on SDS's website. We have subsequently spoken to SDS, who has confirmed that the installation does not appear to follow one of their approved designs.
- The attenuation matts should be wrapped with a geo-textile (lined) to prevent gravel migrating into the honeycomb structure. This is designed to separate the gravel from the attenuation matts. This is applicable for infiltration as well as tanked systems. The photograph shows the liner in the incorrect position.
 - The system is generally laid in a checkerboard pattern to prevent the flow of water through the sub-base becoming blocked in one direction. The photograph shows the system laid in one direction.
 - The photograph also shows what appears to be a discolouration, indicating mud or other site backfill has been used around one of the manholes. If this is the case and some of the material used did not comprise washed gravels, this would permit fine material to clog the system, potentially impacting its functionality.

9. Section 2.2.2. of Odyssey's report states "The as-built sub-base material complies with the design requirement to provide sufficient void ratio for water storage purposes. Please refer to an example of delivery ticket in Appendix B"
- The delivery ticket is insufficient evidence to confirm the sub-base material is of the correct porosity. Particularly as there is no evidence to prove all of the GEOLight was used during construction.
 - This is insufficient evidence to confirm the sub-base material was correctly installed.
 - There is evidence in the photographs and from our engineer's inspection, that the sub-base is not correctly installed.
 - The paving system also includes manholes that are not shown on the approved drainage design. These manholes are of poor quality and must be remediated.
10. We note the date on the as-built signoff sheet is March 2021, however, the aggregate certificate is dated after this (September 2021) please confirm this is not in error and is simply due to the as-built signoff sheets being misdated?
- The as-built signoff sheets also state Permavoid has been used, which is contradicted by Odyssey's report and the photographs.
 - The correct details should be included on all submitted documentation.