Liv Rickman

From: Marcus Fylan-Smith [redacted]
Sent: 19 August 2024 16:57
To: Paul Marino
Cc: [redacted]

Subject: 21185 Carn Thomas - Response to drainage comments
Attachments: Surface Water Drainage Porthmellon Carn Thomas Hill.png; 21185 Infodrainage Rev.C.pdf; 21185 Civils Transmittal 19.08.24.pdf; 21185-200P2.pdf; 21185 Flood Risk Assessment Rev.A.pdf

Hi Paul,

Please see below responses to the drainage queries. Many of them remain the same as before the meeting because we've not had contact with the SuDs representative regarding the original responses.

The drainage proposals have been revised following the information provided by Eddie Williams regarding the existing surface water network and outfall position. All surface water drainage has now been directed to the new outfall pipe location. This has meant the addition of 2 extra inspection chambers, 2 extra manholes and associated pipework.

When we look at modelling the system to current standards, it is apparent that Gully G3 would flood during the critical storm scenario (100 year + 50% climate change). It is important to note that this is not an affect caused by the proposed system joining into the outfall but can be attributed to the more intense storms that are required to be modelled and the original road drainage design more than likely not accounting for such extreme storm events. In essence the existing Gully would flood during a 100 year + 50% CC event as existing. Despite the new proposed system not influencing flooding in this area, it is proposed that a new gully (G4) is positioned next to the existing gully (G3) to alleviate the flood risk and to stop ponding in this area during larger storm events. This will need to be agreed with the representatives for the isles of scilly.

Further to questions on if the surface water drainage hierarchy has been followed, this ultimately relates to ground conditions. As much of IoS, the site is generally underlain by granite. This manifests itself as large granite boulders that gradually become solid granite at depth. The photograph below shows this. The weathering of the granite increases towards the surface and this mixture of silt, sand, gravel, and boulders is known locally as "Rab".

We have had the site investigated. Please see extract below from the Karn Geoservices report dated 10th July.

Slope Stability
At the time of the previous site visit in September 2022 and the investigation in June 2023 signs of spalling were noted to be present across the slopes. The spalling is considered to be the result of oversteepened Made Ground and weathered soils of the IOS intrusion.
The laboratory testing undertaken as part of this investigation identified angles of shearing resistance between 35° and 43° whereas the existing slopes are stood at 60° to 90°. The test results are a reflection of the finer material only and the soils are noted to be predominantly granular; however, it is considered that the results are reflective of the ground conditions. The results show the existing slopes to be significantly over steepened and are therefore likely to continue spalling until remedial work is undertaken.

Based on the laboratory testing and site observations it is recommended that any Made Ground is battered back to a maximum slope angle of 30° and the underling soils of the weathered IOS Intrusion battered back to 40°. Where the proposed slope angles are not appropriate for the proposed development, it is recommended that the slopes are faced with retaining structures. All exploratory holes terminated upon refusal both vertically and laterally indicating the top of the intact bedrock to be near surface. The exploratory holes terminated on boulders of various size held in a matrix of more weathered soil and according to Stead et al (2000) this material should be treated as heterogeneous ground.

While the boulders themselves are competent granite, they are not wholly intact and the matrix between typically comprises fines material. Due to the nature of this matrix, there is potential for destabilisation when the slope is surcharged, or high groundwater conditions are encountered. It is considered that this material is generally stable in its current condition, however, the long-term stability cannot be guaranteed without remedial work. As with all modes of slope stability, groundwater and surface water are key factors when considering potential destabilisation. The ground investigation was undertaken during a period of pro-longed dry weather and no groundwater was observed with the excavations or issuing from slope faces. No surface water was observed at the time of the site

works. It is recommended that suitable drainage is installed across the site to prevent the pooling of water at the crest and toe of
the slope along with preventing run-off over the slope faces.

If further excavation works are to be undertaken on site, there is potential that the intact IOS Intrusion will be encountered in the rock faces. The stability of the intact rock will be controlled by the jointing and texture of the rock mass. The intact bedrock was not exposed at the time of the investigation and therefore kinematic analysis of potential joint controlled failures has not been undertaken.

It is considered that the global stability of the slope is likely to be stable in its current state providing groundwater and surface water are controlled appropriately. Any failures on the site are likely to be limited to ongoing sloughing and spalling of the benches.

Recommendations
Based on the above assessment, the slopes are considered to be unstable in their current condition. The following recommendations are given to ensure long term stability of the slopes:
• Made Ground must be battered back to 30° or retained appropriately.
• The soils of the weathered IOS intrusion must be battered back to 40° or retained appropriately.
• Assessment of jointing within the rockmass if the intact rock is exposed.
• Drainage and control measures put in place to prevent surface water run-off and pooling of water at the crest or toe of the slopes.

Overall, the stability of the site will require design consideration to ensure long term stability is guaranteed and short-term stability can be relied upon for the safety of any workers present onsite. With the correct engineering systems in place the slopes can be made stable and therefore protective of the construction work, end users and boundary properties.

As is the case with much of the IoS, infiltration discharge techniques, such as soakaways, are not appropriate for the site as the weathered granite doesn't offer good percolation, the underlain boulder material can become unstable, and there is a risk of uncontrolled breakout on steeper slopes. As previously discussed, we can explore the use of swales / bioretention systems but these would need to be positively drained so we would question the appropriateness of use here where not really required.

No groundwater testing has been completed in support of infiltration drainage because we are not planning to use infiltration drainage techniques to serve the site. No groundwater has been observed on the site during any investigative works.

With regards to the comments made by the SuDs representative. Please see responses to comments below. I have provided a commentary (text in blue) to each point raised, with supporting items attached.

Foul Water Proposals

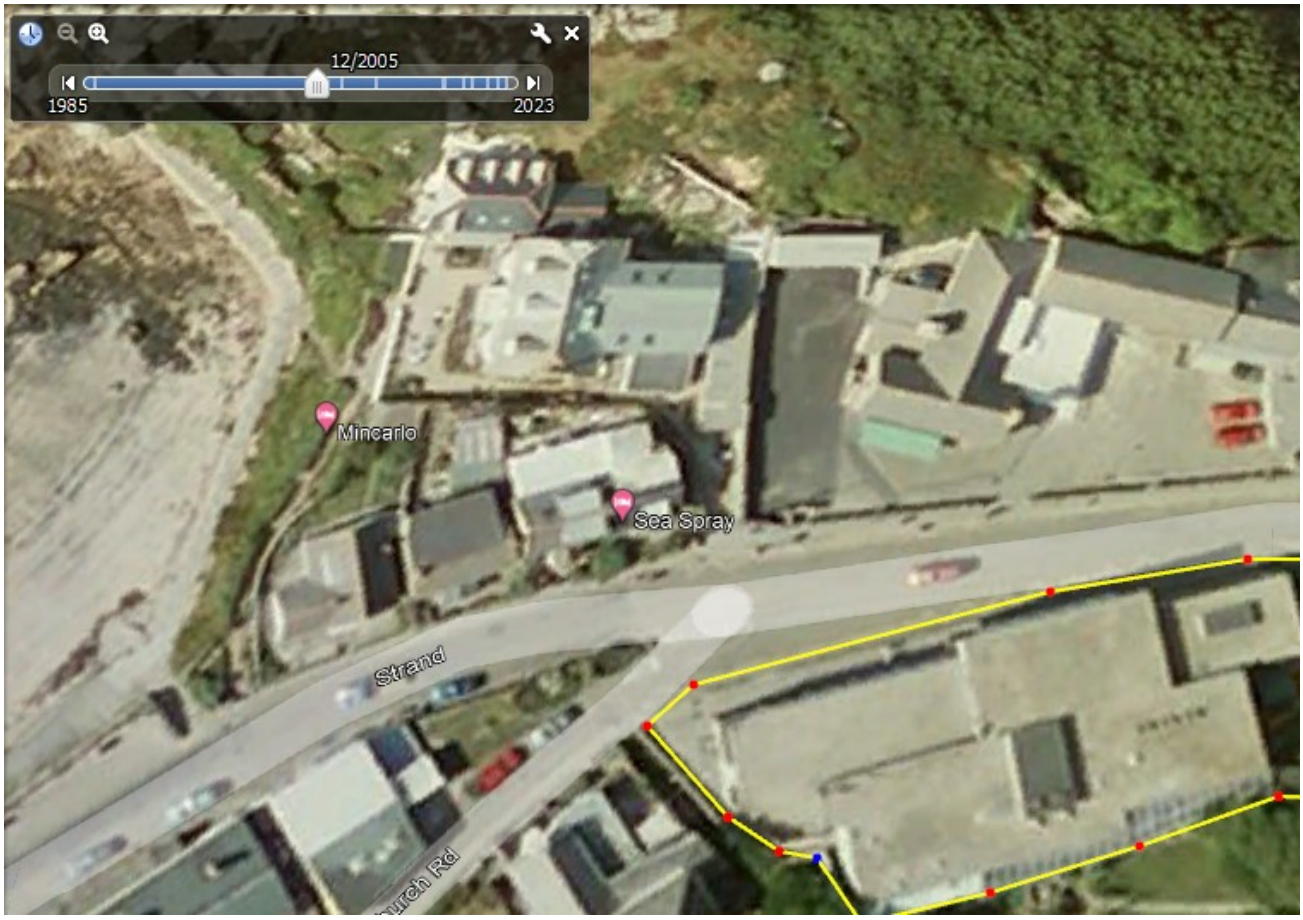
- No action required.

Surface water Proposals

- *In the report, it mentions that there is a requirement to design a SuDS solution for up to the 1 in 100-year flood event plus 50% climate change plus an additional 10% on the impermeable area for future development <u>and this has not been provided</u>.*
  Yes it has. Please refer to FRA. We also attach again a copy of InfoDrainage calculations.

    1) What was the impermeable area of the site when it was a school and what is the proposed impermeable area of the 27 houses development and hardstanding to include the additional 10% for future development? Is there an increase in impermeable areas because of the development? Expressed in a table.
    We don't have any historic records to interrogate. However, an estimate using Google Maps suggests a minimum 1900.00m^2. See extract below from Google Maps 2005 prior to demolition of school.

The proposed impermeable area is less at 1690.00m^2, which also includes the 10% urban creep (future development) allowance. Please see attached InfoDrainage Calculations (Rev. C).



2) What was the peak flow rate (l/s) and volume discharged (m3) in S1.5 from the existing school site discharging into the 150mm pipework in Telegraph Road for the critical storm for the 1 in 10, 1 in 100 plus 50% CC, and 1 in 1000-year return periods? Expressed in a table.
   We have not modelled the 1000 year storm as there isn't any guidance which dictates we should do so? This would flood the system.
3) What are the peak flow rates (l/s) and max volume discharged (m3) for the critical storm from the proposed site discharging via the existing 150mm pipework S1.5, and the new 100mm S2.1 connection for the 1 in 10, 1 in 100 plus 50% CC and 1 in 1000-year return periods? Expressed in a table.
   Please see attached InfoDrainage Calculations (Rev. C).
   We have not modelled the 1000 year storm as there isn't any guidance which dictates we should do so?
4) Comment on the disparity (if any) between the flow rates and volumes from the site.
   The proposed impermeable area is less than the historic school site. See comments above. We do not have details of the historic underground drainage systems on site to compare flow rates and volumes as suggested.
5) Can the applicant provide written consent from the owner of the pipework in the road to prove permission has been granted to connect the surface water from the development into the existing 150mm pipe and the new 100mm connection. SWW suggests that this pipework is Highways pipework and not a surface water public sewer. What is the cyclical maintenance regime for the pipework and gullies and who is responsible for this.
   Isn't this managed by the Isles Of Scilly Council? In light of their support for this application, we would expect their approval especially as this system served the school on the site previously.

We have provided a Maintenance and Management schedule (attached) which can be adopted by Livewest and Isles Of Scilly Council as required.

6) On the MBA drawing J-21185-200 P1, it shows that the outlet from G2 and G1 outlets are not visible – can this be explained and what are the implications of having not visible outlets in these two highway gullies.
   We suggest this is because they have trapped outlets under a depth of water in the gully.
7) The MBA drainage drawings states "that it was unable to locate the outlet, suspected to outfall amongst boulders". Can the applicant confirm via dye testing and CCTV that the pipework from SW MH 3 to the outfall is structurally sound and can take the expected flows from the proposed development.
   The outlet position has now been revised on drawing 21185-200P2 following information from Eddie Williams regarding the current surface water regime. Please see attached 'Surface Water Drainage Porthmellon Carn Thomas Hill'. The new outfall is the existing one shown on the attached mark-up.
8) The MBA drawing shows that the surface water pipework in Telegraph Road extends to the west of the development, but there is no information to know what does connect into the surface water drain upfront of SW MH 3. A drainage investigation would be required to establish what connects upstream of SW MH3.
   An existing services survey was completed (copy attached) which shows the extent of the SW drainage around the site. There are no other connections other than that shown. It is understood the SW system served the school with the survey showing historic connections at the old school entrance. In addition, the school used to have a drop off area adjacent the road which has been removed. It is thought the western connection could have served this area previously? The connection is shallow (0.59m deep) commensurate with a gully connection.
9) It would be necessary for the applicant to provide additional hydraulic calculations to prove that there is sufficient capacity in the existing 150mm pipework between SW MH3 and the outfall, for the critical storm for all storm durations (1 in 10, 1 in 100 plus 50%CC and 1 in 1000 year) from the development together with including the existing flow upstream of SW MH 3. It would be necessary to also include an analysis if the outfall pipework became surcharged due to high tides for example or a blockage, and the implications on the proposed development site and the wider catchment. This should show flood flow paths if the manholes spill.
   Hydraulic calculations have been provided as requested which demonstrates the existing 150mm pipework between SW MHS1.003 and the outfall as capacity for the storm durations 1 in 10, 1 in 100 plus 50%CC. We have not modelled the 1000 year storm as there isn't any guidance which dictates we should do so?
   Water would continue to discharge to sea even with a discharge point under water. How is it envisioned the system would surcharge? The surcharge would only be as high as the tidal water level?

In response to the Flood Risk comments for specific technical queries.

10) Has a survey been done of the pipework in Telegraph Road? Extensive sea defences have been installed in the location of the eastern outfall indicated on the submitted Drainage Plan.
    See comments above to point 7.
11) Has the drainage hierarchy been considered? See SWW comments. Currently unclear whether consideration has been given to 1) water re-use or 2) infiltration. Is infiltration feasible, has winter groundwater testing been carried out?
    We are discharging to the sea? A flood risk /drainage strategy has been provided.
12) Has consideration been given to all four CIRIA SuDS pillars?
    We are not providing SuDS features as we are discharging to the sea. Are we supposed to provide SuDS features just to be able to uphold the four CIRIA SuDS pillars? Isn't the most sustainable system a system which conveys water to the sea? That's why there is no restriction on flow to the sea because that's ultimately where you are looking to discharge water to without flooding on its journey?
13) Are water butts proposed for all dwellings?
    Yes.

Kind regards,

Marcus Fylan-Smith

For and on behalf of

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