Andrew King

From: Planning (Isles of Scilly)
Subject: FW: 21185 Carn Thomas - Response to drainage comments

From: Marcus Fylan-Smith
Sent: 05 September 2024 10:42
To: Olivia Rickman
Cc: Stella New, Simon Jones; Robin Thorn; Paul Marino; Lisa Walton
Subject: FW: 21185 Carn Thomas - Response to drainage comments

Hello Liv,

Thank you for providing a list of responses from Louisa. Please see my responses in Blue and attached information to go with the comments.

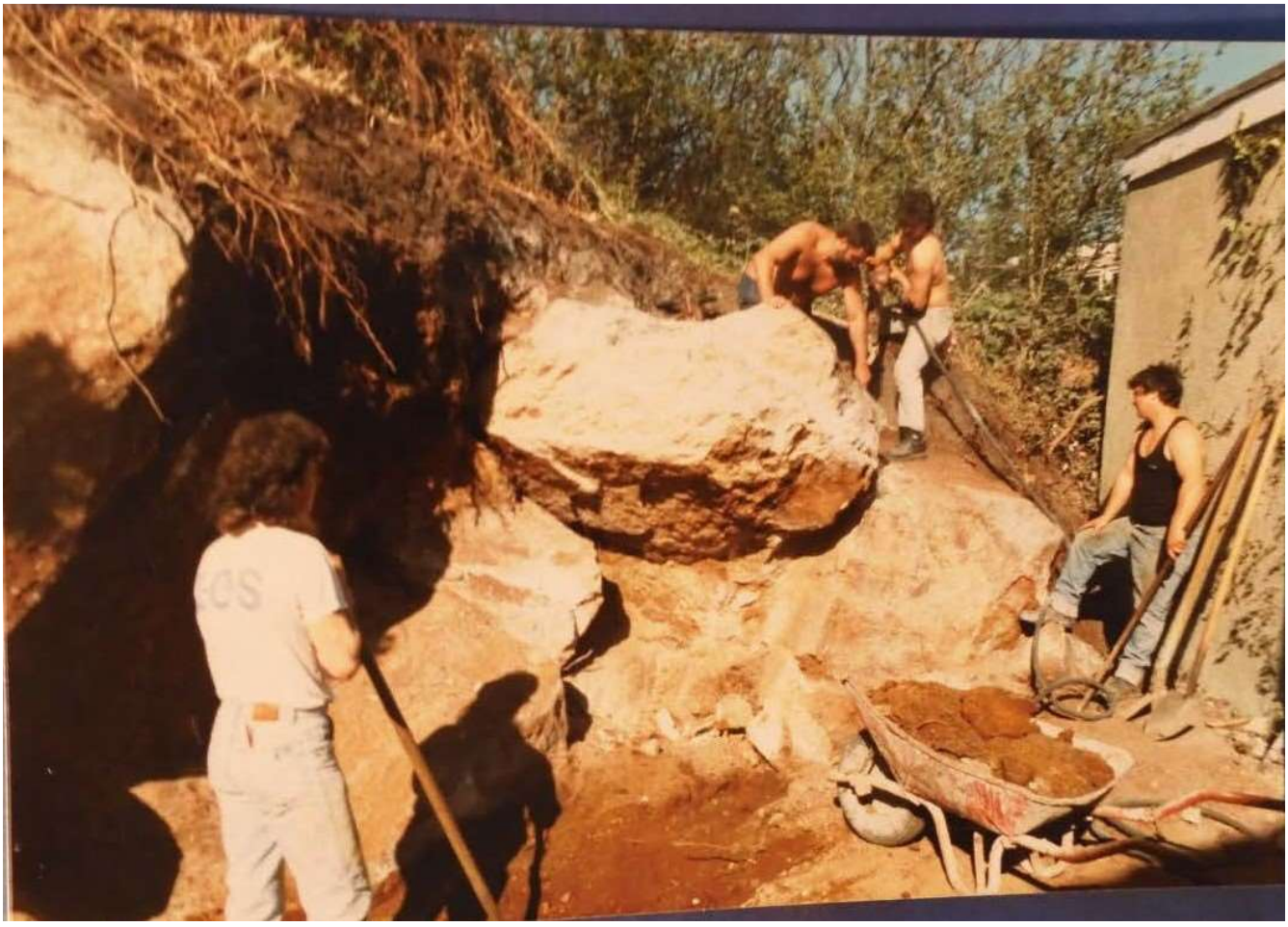
Please see below responses to the drainage queries. Many of them remain the same as before the meeting because we've not had contact with the SuDs representative regarding the original responses.

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. It is understood that the existing surface water network which drains the road and currently drains from SWMH 3 to G2 to G1 and to the outfall, will now be intercepted between SWMH 3 and G2 and a new 150mm pipe will be laid with new manholes S1.005, S1.004, S1.003, S1 002 and S1.001 to the outfall. It is not clear how far this pipe will extend along the slip way and the beach and whether permission has been obtained by the landowner, to lay this pipework to the desired outfall location. Robin has addressed this comment in his email. I will add his response here for ease. Regarding placing of pipework close to the slip way and the beach we have not yet obtained permission of the landowner, to lay this pipework to the desired outfall location. However, as part of LiveWest's approval process we need to obtain the written consent of the Duchy of Cornwall who benefit from a restrictive covenant on the development site, as does the Ios Council. I appreciate it is presumptuous and not a forgone conclusion, but by working together, we would hope to obtain permission of the Council and Duchy of Cornwall as landowners to deliver the affordable homes including procuring requisite permissions and street works licences to lay any new drains.

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). Drawing 21185 200 P2 has two gullies ref G3, one to the west of the site G3 CL 9.70 and IL 9.40 and the other to the east of the site and near to the proposed outfall G3 CL TBC, which G3 would flood? G3 CL TBC close to the outfall. The new gully has now been renamed G9 on drawing 21185-200-P3. 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. Could this be made clearer on the drawing as to which one will be the new Gully please ? Gully revised to G9 and is situated next to existing gully G3. When the modelling was undertaken, was the correct impermeable area already draining to SW MH 3 used and what was this impermeable area? The model represents the future condition so only impermeable area draining to SW MH 3 comes from the site. The only other connection to SW MH 3 is no longer in use. The total impermeable

area draining into SW MH 3 is 990m^2 (900m^2 + 10% Urban Creep Allowance). Does this network only drain the road or are there other connections from properties or businesses? The network drains part of Telegraph road and the site. Using the survey undertaken and the survey information provided by Eddie, no other connections to the network exist (businesses or properties). Does the modelling focus just on the area provided by the drawing 21185 200 P2 or does the modelling extend to drainage infrastructure at the head of the surface water runs which drains to surface water manhole SWMH 3 from the west? No active connections exist to the west of SW MH 3. The connection that is shown on the survey is a connection to the site (previously the school) that is no longer in use. SW MH 3 sits at a high point on Telegraph road and falls from just west of this point in either direction. The modelling focuses on all impermeable area draining to the surface water system. This includes all impermeable area on site and all impermeable area on Telegraph road that drains to gullies G1, G2, G3, the existing outfall and proposed G9.

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. When was this photograph taken and where was it taken? MBA obtained the photo during the work on the demolition of the school (this site). It is thought to have been taken adjacent the sub-station which was on the northwestern corner of the site. The Photo would have been taken during construction of the school. Eddie knows the chaps in the photo, he might be able to provide more information if required. We have always used this photo as a useful way to describe the general ground conditions on the Isles of Scilly on other projects. 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 and this has not been provided.*
  Yes it has. Please refer to FRA. We also attach again a copy of InfoDrainage calculations. The FRA and the Info Drainage Calculations are not clear on what is the actual impermeable area on the proposed site and what is the 10% urban creep. Could this be provided in terms of m2 please? It is noted that in section 5.7 in the FRA that 10% will be added.

  Total Impermeable Area on Site - 1560m^2
  Total Impermeable Area on Site + 10% (Urban Creep) - 1710m^2
  Road Impermeable Area draining to the gullies G1, G2, G3 – 1410m^2
  Total Impermeable area in model – 3120m^2 (1710 + 1410)

Project: 21185 Carn Thomas Isles of Scilly			Date: 18/03/2024 Designed by: MFS	Checked by:	Approved By:		
Report Details: Type: Inflow Summary Storm Phase: Phase			Designer: MBA Consulting				
Catchment Area (4)	S2.005		Time of Concentration	0.003	100	0	10
Catchment Area (5)	S3.003		Time of Concentration	0.002	100	0	10
Road to G1	G1		Time of Concentration	0.026	100	0	10
Road to G2	G2		Time of Concentration	0.026	100	0	10
Road to G3	G3		Time of Concentration	0.042	100	0	10
Road to G4	G4		Time of Concentration	0.047	100	0	10
TOTAL		0.0		0.297			

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). Noted.

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. Please could we be supplied with the peak flow rate (l/s) and the volume discharged (m3) at T1.006 (150mm diameter gradient 1:9) and expressed in a table. It is noted that 1 in 1000 year is not requested in guidance, and can be excluded.

1 in 10 Discharge Volume (m^3) Peak Flow l/s

T1.006	FEH: 10 years: +0 %: 15 mins: Winter	Pipe	S1.006	SWMH 3	10.237	9.529	0.100	11.607	1.7

1 in 100 plus 50% CC

T1.006	FEH: 100 years: +50 %: 15 mins: Winter	Pipe	S1.006	SWMH 3	10.237	9.940	0.150	31.823	2.2

Also shown in the Infodrainage calculations attached.

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). Please could we be supplied with this peak flow (l/s) and max volume discharged through T2.001 (100mm diameter gradient 1:9) and expressed in a table.

1 in 10 (m^3) Peak Flow l/s Discharge Volume

T2.001	FEH: 10 years: +0 %: 15 mins: Winter	Pipe	S2.001	S1.005	7.344	6.039	0.100	10.064	2.2	0.84	17.2

1 in 100 plus 50% CC

T2.001	FEH: 100 years: +50 %: 60 mins: Winter	Pipe	S2.001	S1.005	7.344	6.582	0.100	49.551	3.0

Also shown in the Infodrainage calculations attached.

We have not modelled the 1000 year storm as there isn't any guidance which dictates we should do so? It is noted that 1 in 1000 year is not requested in guidance, and can be excluded. Noted.

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. Noted.
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. Can this be confirmed by the Isles of Scilly Council? Previously discussed in a point above.
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. What would be the implications of an outlet under a depth of water in the gully? Would this surcharge the system for example, or does this suggest that the system is already surcharged? The drainage no longer proposes to connect into this system.
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. Could it be confirmed that the location of the new outfall downstream of S1.001 has permission from all landowners to be laid at the proposed location as indicated on drawing 21185 200 P2? Would this require a MMO Licence or permission form Duchy of Cornwall for example? The outfall suggested is an existing outfall provided on Eddie's mark-up. We would be creating a new connection into this existing outfall. Permissions have been discussed in a point above.

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. Can you confirm, through your on site investigations there are no other connections (legal or illegal) that connect to the west of the surface water pipework in the road marked EOT 0.59m dp and if the pipework system became blocked or surcharged there would be no impact on other properties to the West of EOT 0.59m? There are 3 marked gullies G3, G4, G5 and G6 which are located to the west of the site, where do these drain ? West of the marking EOT 0.59m the road starts to fall in the direction of G3, G4, G5 and G6. These gullies do not connect into the system, but instead eventually drain to the Town Beach. No other connections were found during the survey.

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. Please can these be provided in a table? It is noted that in paragraph 5.5 of your FRA it states that " *where infiltration is not possible, all off site surface water discharges from the developments should mimic greenfield performance up to a maximum of the 1 in 10 year discharge rate. On site all surface water should be safely managed up to the 1 in 100 year plus climate change conditions. This will require additional water storage areas to be created thereby contributing to a reduction in flooding downstream.*" Could you make it clear as to whether this has been followed in the proposed SuDS Strategy? If not why not ? It seems to be that water will be discharged via a 150mm and a 100mm pipe with 6 no. type C manholes, 3 no. type B and 1 no. type A manholes, is this sufficient for the 1 in 100 year plus 50% climate change storage? . All information regarding all the storms modelled can be found in tables within the Infodrainage Calculations attached. Separate to the storage provided within the Manholes, oversized pipes can be found on the site. These range from 150mm to 600mm to provide extra storage. These storage solutions together with the 100mm and 150mm pipes throttling the outward flow, allow for the safe management of all storms previously mentioned. The proposed strategy has been followed to ensure the site and all areas downstream of the site are not at risk of flooding from all storm events up to the 1 in 100 year + 50% CC.
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? The point being made is if the outfall became blocked or was surcharged during a high spring tide for 4 hours, if there was a significant rainfall event over that same 4 hour period, what would be the effect from S.1001 to SWMH 3, to the wider catchment and to the site. Eddie confirmed during the meeting that this outfall is checked and unblocked regularly.

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. It is noted the proposal for this site will drain to the sea which will have some throttling via the 150mm diameter and 100mm diameter offsite. It will be necessary to see to what extent this has been provided. It is noted that infiltration is unlikely due to the slop instability and the underlying geology. LLFA's and Cornwall Council currently request that Groundwater monitoring be undertaken over the winter months to establish the peak winter groundwater table. The groundwater was discussed in the extract provided in your comments above, and it would be necessary to establish the impact of the groundwater table on the ground stability, retaining features and the proposed french drains. It is therefore proposed that groundwater monitoring over the winter months be undertaken at agreed positions across the site between Oct and Mar.
No groundwater has been observed on the site during any historical excavations. French drains will only be used to drain small areas such as patios. We don't need Groundwater monitoring on the site because we are not offering SuDs features on the site.

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? See section 5.5 of your FRA which states that *all on site surface water discharges from developments should mimic greenfield performance up to a maximum 1 in 10 year discharge rate. On site all surface water should be safely managed up to the 1 in 100 year event plus climate change conditions. This will require additional water storage areas to be created thereby contributing to a reduction in flooding downstream.* Are you saying that you are now no longer providing a solution that complies with paragraph 5.5 in your FRA and there is now no restriction on flow from the site as it is discharging to the sea ? It was stated that the 150mm and the 100mm will provide restriction, but it is that now not the case? The strategy has not changed. The two pipes still restrict flow and extra storage has been provided on site to cater for the restricted flow. Consideration has been given to all SuDS pillars. We have concluded that due to the sites sloping nature, ground conditions and proximity to the sea, that it does not lend itself to providing features that may slow flow rate. Equally it does not lend itself to open features given the gradients on site. These thoughts have been echoed by the Landscape Architect also.

13) Are water butts proposed for all dwellings?
Yes. Noted.

From: Louisa - Premier Water Solutions
Sent: 02 September 2024 12:24
To: Lisa Walton
Cc: Rebecca Williams (Head of Environment); Planning (Isles of Scilly)
Subject: RE: 21185 Carn Thomas - Response to drainage comments

Dear Lisa and Rebecca, My comments are in red so you can see my comments.

It is up to you if you want to enforce the over winter groundwater monitoring..

Hope the comments help. The micro drainage results, provided to me don't show the flow rate, volume discharged or peak water level, that's why I have asked for the figures to be presented in a separate table.

Let me know if you need anything else!

Best wishes,
For and on behalf of Premier Water Solutions (10) Ltd

Louisa

Louisa Inch
CEnv MIEMA MCIWEM C.WEM BSc (Hons)
Managing Director

From: Marcus Fylan-Smith
Sent: 19 August 2024 16:57
To: Paul Marino
Cc: Robin Thorn; Mark Powell; Simon Jones; Susannah Harrison; Claire (foxforddesign)
Subject: 21185 Carn Thomas - Response to drainage comments

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. It is understood that the existing surface water network which drains the road and currently drains from SWMH 3 to G2 to G1 and to the outfall, will now be intercepted between SWMH 3 and G2 and a new 150mm pipe will be laid with new manholes S1.005, S1.004, S1.003, S1 002 and S1.001 to the outfall. It is not clear how far this pipe will extend along the slip way and the beach and whether permission has been obtained by the landowner, to lay this pipework to the desired outfall location.

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). Drawing 21185 200 P2 has two gullies ref G3, one to the west of the site G3 CL 9.70 and IL 9.40 and the other to the east of the site and near to the proposed outfall G3 CL TBC, which G3 would flood? 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. Could this be made clearer on the drawing as to which one will be the new Gully please ? When the modelling was undertaken, was the correct impermeable area already draining to SW MH 3 used and what was this impermeable area? Does this network only drain the road or are there other connections from properties or businesses? Does the modelling focus just on the area provided by the drawing 21185 200 P2 or does the modelling extend to drainage infrastructure at the head of the surface water runs which drains to surface water manhole SWMH 3 from the west?

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. When was this photograph taken

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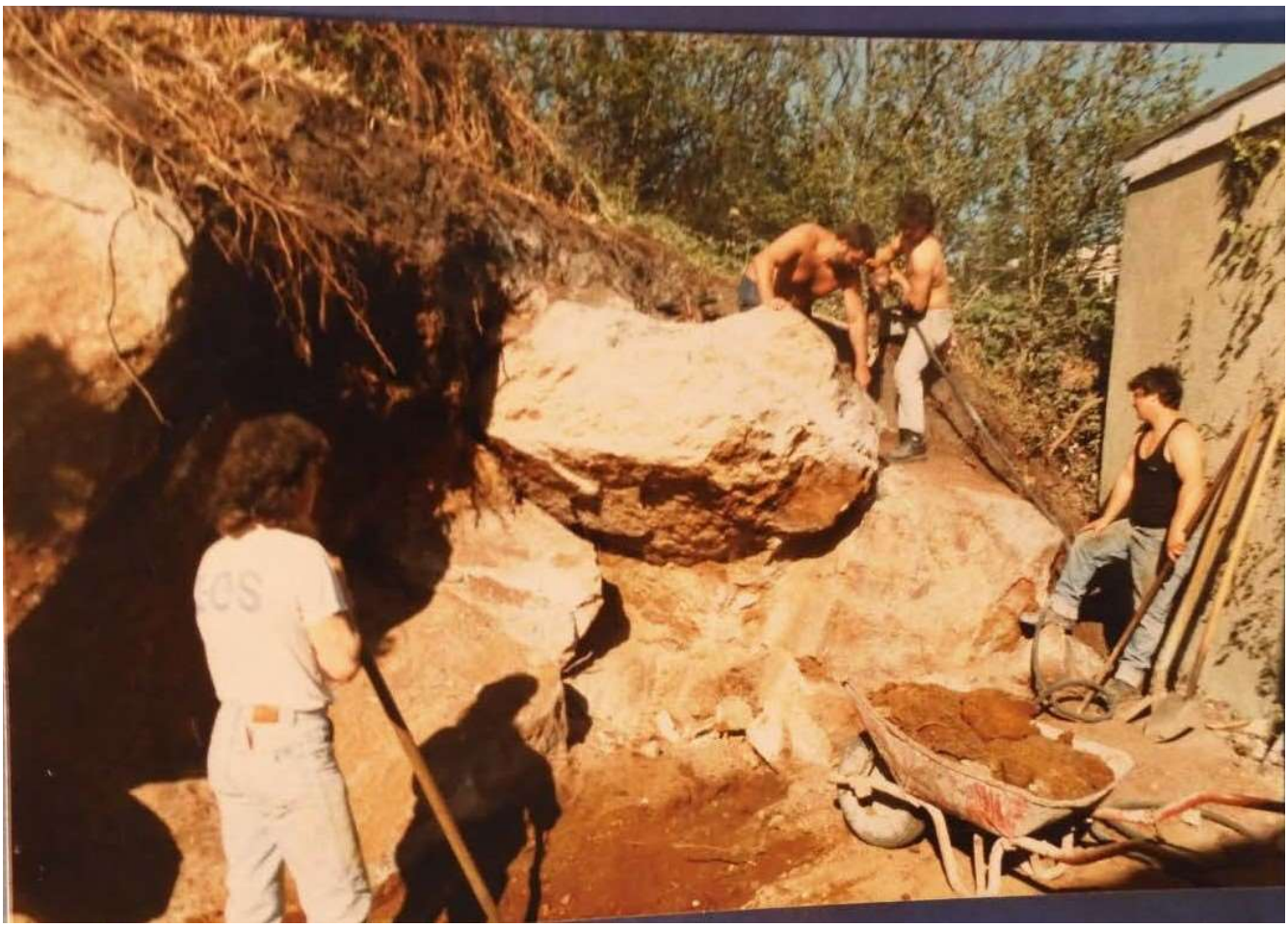

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As is the case with much of the IoS, infiltration discharge techniques, such as soakaways, are not appropriate for the site as the weathered granite doesn't offer good percolation, the underlain boulder material can become unstable, and there is a 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. The FRA and the Info Drainage Calculations are not clear on what is the actual impermeable area on the proposed site and what is the 10% urban creep. Could this be provided in terms of m2 please? It is noted that in section 5.7 in the FRA that 10% will be added.

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). Noted.

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. Please could we be supplied with the peak flow rate (l/s) and the volume discharged (m3) at T1.006 (150mm diameter gradient 1:9) and expressed in a table. It is noted that 1 in 1000 year is not requested in guidance, and can be excluded.
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). Please could we be supplied with this peak flow (l/s) and max volume discharged through T2.001 (100mm diameter gradient 1:9) and expressed in a table.
We have not modelled the 1000 year storm as there isn't any guidance which dictates we should do so? It is noted that 1 in 1000 year is not requested in guidance, and can be excluded.

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. Noted.
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. Can this be confirmed by the Isles of Scilly Council?
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. What would be the implications of an outlet under a depth of water in the gully? Would this surcharge the system for example, or does this suggest that the system is already surcharged?
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. Could it be confirmed that the location of the new outfall downstream of S1.001 has permission from all landowners to be laid at the proposed location as indicated on drawing 21185 200 P2? Would this require a MMO Licence or permission form Duchy of Cornwall for example?
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. Can you confirm, through your on site investigations there are no other connections (legal or illegal) that connect to the west of the surface water pipework in the road marked EOT 0.59m dp and if the pipework system became blocked or surcharged there would be no impact on other properties to the West of EOT 0.59m? There are 3 marked gullies G3, G4, G5 and G6 which are located to the west of the site, where do these drain ?
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. Please can these be provided in a table? It is noted that in paragraph 5.5 of your FRA it states that " *where infiltration is not possible, all off site surface water discharges from the developments should mimic greenfield performance up to a maximum of the 1 in 10 year discharge rate. On site all surface water should be safely managed up to the 1 in 100 year plus climate change conditions. This will require additional water storage areas to be created thereby contributing to a reduction in flooding downstream*." Could you make it clear as to whether this has been followed in the proposed SuDS Strategy? If not why not ? It seems to be that water will be discharged via a 150mm and a 100mm pipe with 6 no. type C manholes, 3 no. type B and 1 no. type A manholes, is this sufficient for the 1 in 100 year plus 50% climate change storage? . 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? The point being made is if the outfall became blocked or was surcharged during a high spring tide for 4 hours, if there was a significant rainfall event over that same 4 hour period, what would be the effect from S.1001 to SWMH 3, to the wider catchment and to the site.

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. It is noted the proposal for this site will drain to the sea which will have some throttling via the 150mm diameter and 100mm diameter offsite. It will be necessary to see to what extent this has been provided. It is noted that infiltration is unlikely due to the slop instability and the underlying geology. LLFA's and Cornwall Council currently request that Groundwater monitoring be undertaken over the winter months to establish the peak winter groundwater table. The groundwater was discussed in the extract provided in your comments above, and it would be necessary to establish the impact of the groundwater table on the ground stability, retaining features and the proposed french drains. It is therefore proposed that groundwater monitoring over the winter months be undertaken at agreed positions across the site between Oct and Mar.
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? See section 5.5 of your FRA which states that *all on site surface water discharges from developments should mimic greenfield performance up to a maximum 1 in 10 year discharge rate. On site all surface water should be safely managed up to the 1 in 100 year event plus climate change conditions. This will require additional water storage areas to be created thereby contributing to a reduction in flooding downstream.* Are you saying that you are now no longer providing a solution that complies with paragraph 5.5 in your FRA and there is now no restriction on flow from the site as it is discharging to the sea ? It was stated that the 150mm and the 100mm will provide restriction, but it is that now not the case?
13) Are water butts proposed for all dwellings?
Yes. Noted.

Kind regards,

Marcus Fylan-Smith

For and on behalf of

MBA CONSULTING

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