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Title:Drainage Strategy – Gnoll Park

Date:02/08/2023

Version:P1

I. Introduction

Jubb have been appointed by Andrew Scott td. to provide engineering input relating to a drainage strategy for the re-development of an existing facility and its associated works, located at Gnoll Country Park, Neath on National Grid Reference SS766975, 2766975 E; 197559 N, postcode SA11 3EF.

The site is divided into six work area zones approximately 3 ha in size and is currently occupied by a visitor centre, pond cottage, ruins, service yard, potting sheds and associated car parking.

The proposed re-development will include the six work area zones, which are identified in the table below:

Area	Description	Proposed Works	SAB	Rationale
01	Gnoll House Ruins	Restoration and repair	YES	New concrete slab theatre and outdoor concrete stage. Repair to existing ruins and internal walls in the cellar (impermeable). No change to existing footprint. Resurfacing existing footpaths.
02	Visitor Centre	Proposed new visitor centre	YES	Demolition of existing visitor centre and construction of new visitor centre with associated footpaths.
03	Pond Cottage	Restoration and minor extension	NO	Proposed minor extension (35m ²) to existing building. Existing building to remain. Extension is less than 100m ² , therefore SAB is not applicable.
04	Kitchen Garden & Service yard	Cabin accommodation lodges, service yard and Carpark	YES	New prefabricated lodges, storages areas and additional parking areas.
05	Main Carpark	Proposed additional carpark	YES	New overflow carpark, more than 100m ² .
06	Woodland Bridge	Proposed bridge	NO	Less than 100m ² , therefore SAB is not applicable.

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II. Drainage Strategy

As part of the advancement in Sustainable Drainage Systems (SuDS) design, legislature was implemented on 7th January 2019 in Wales to enforce Schedule 3 of the Flood and Water Management Act 2010. This led to the establishment of SuDS Approval Bodies (SABs) for each LLFA. In the case of this development and under requirements of the above legislature, Neath Port Talbot Council would look to review and approve any surface water drainage design proposed for the development, with the intention of adopting possible SuDS features. Any SuDS proposed would need to conform to CIRA C753, 'The SuDS Manual' and any additional guidance or information provided by the LLFA. Any drainage design previously proposed to connect to a Dwr Cymru surface water (SW) or highway asset would now be subject to a detailed application & formal approval process, prior to construction and/or communication of drainage flows from the development.

Refer to Appendix A - JUBB drawings 00500, 00501, 00502 & 00503

i. Surface Water Strategy

- A SAB pre-application has been submitted to Neath Port Talbot Council and is currently being assessed by the SAB team.
- Areas 01 and 05 – Surface water runoff is proposed to discharge via infiltration. The geotechnical soakaway tests indicate good infiltration rates in Area 05, with Area 01 not having any alternate disposal method and being located in an open green area away from structural foundations. Soakaway infiltration tests have been requested in Area 01.
- Area 02 – Surface water runoff is proposed to discharge to the existing waterbody. The brownfield runoff rate for this area was calculated as 11.61 l/s. The proposed discharge rate for this area will be 13.94 l/s. The discharge is proposed to be unrestricted free discharge, as the additional flow of 2.33 l/s is not deemed to be detrimental to the existing waterbody, which has an overflow spillway.
- Area 04 – Surface water runoff is proposed to discharge to the existing waterbody via the existing stream. The proposed discharge rate will be limited by two separate flow control chambers for all storm periods up to the 1 in 100-year + 40% CC. The brownfield runoff rate for this area was calculated as 45.35 l/s, with a betterment of 30% applied to this, the proposed discharge rate will be 31.74 l/s.
- It is anticipated that ordinary watercourse consents (OWC) will be required from Natural Resources Wales (NRW) to allow discharge into the adjacent waterbodies.
- The existing stream and waterbodies are within the development, with both waterbodies having spillway overflows.
- Subject to SABs approval, surface water drainage is proposed to drain via SUDs features which provide treatment, prior to discharging to ground via infiltration or discharging to the waterbodies.
- Two attenuation tanks of 0.8m deep are proposed in Area 04 to provide storage, which has been sized to accommodate events up to and including the 1-in-100-year storm event + 40% CC.
- An infiltration tank of 0.8m deep is proposed in Area 01 and permeable paving at 0.15m deep (sub-base) in Area 05, which have been sized to accommodate events up to and including the 1-in-100-year storm event + 40% CC, including the application of a factor of safety of 5, in line with Table 25.2 of Ciria C753 SuDS Manual.

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- Site levels will be designed to convey overland flows away from the proposed development during exceedance events and in the event of failure, runoff will flow freely over the site toward the permeable paving, landscaped areas and adjacent waterbodies.
- Infiltration has been designed with factors of safety and attenuation tanks include a fail-safe measure of 100mmØ high level overflow pipes on the flow controls.

ii. SuDS Features

- Runoff from impermeable roof areas, roadways, hardstanding footpaths and car parking is proposed to be conveyed into green roofs, raingardens and permeable paving prior to discharging via infiltration or to the waterbodies.
- Where possible, proposed rainwater pipes from buildings are to pass through adjacent rain gardens to aid treatment, improve water quality and reduce peak flow rates.
- The SuDS features proposed have been selected based upon mitigation index values given within Tables 26.2 & 26.3 of CIRIA C753. The SuDS features proposed are suitable up to medium pollution hazard level. We note that not all SuDS features are equal in their ability to treat surface water, and the three main categories of pollutants: total suspended solids (TSS), metals & hydrocarbons.

iii. Foul Water Strategy

- Foul water drainage is only required for Areas 02, 03 and 04.
- Refer to Jubb Non-Mains Drainage Assessment.
- The site is located outside DCWW coverage, which runs adjacent to the development. The closest public foul sewer available for connection is located approximately 250m north of the visitor centre and approximately 350m south of pond cottage and the kitchen gardens.
- The sewer route for the visitor centre is not feasible as it would need to cross through third party land over a length of 250m with a level change of approximately 20m.
- The sewer route for the pond cottage and kitchen gardens is not feasible as it would have to be routed around the existing pond (to avoid the woodland) within the existing carriageway and would cross a watercourse, over a length of 350m with a level change of approximately 30m.
- NRW guidance also indicates that a sewer more than (maximum discharge volume in L/750) x 30m would not be viable for a sewer connection. Applying this to:
 - Area 02 - Visitor Centre: 150 people (assumed) x 30l = 4500l
= 4500 / 750 = 6 x 30m
= 180m (less than the required 250m to connect to the closest sewer).
 - Areas 03 & 04 - Pond Cottage and Kitchen Gardens: 42 people x 150l = 6300l
= 6300 / 750 = 8.4 x 30m
= 252m (less than the required 350m to connect to the closest sewer).
- Hence, a public sewer connection is not feasible and has been discounted. The drainage strategy proposes two separate Package Treatment Plants to treat the foul water flows from the visitor centre and pond cottage & kitchen gardens, prior to discharging to the adjacent pond for the visitor centre and to the adjacent watercourse for pond cottage and kitchen gardens.

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- Porosity tests have been undertaken across the site, the tests suggest that the sites' average infiltration rate is 1.14×10^{-4} m/s which produces a subsequent average Vp of 2.92. The fast infiltration rate has deemed the tested strata to not be suitable as an infiltration medium for treated foul per The Building Regulations Part H as its too fast to provide tertiary treatment. It is possible to import filter sand or similar, to artificially reduce the speed of infiltration however this method has been deemed not economically feasible. Additionally, the required drainage fields are too large to be located appropriately on site due to the steep topography and the woodland tree root protection areas.
- As ground has been deemed not suitable as a method of discharge, a watercourse would be the next preferred option when following the hierarchy of discharge for treated foul water.
- The site contains two ponds which are deemed to be a suitable location for discharge on initial review.
- It is anticipated that a discharge license is required from NRW to allow the treated effluent to discharge into the adjacent waterbodies, including a separate operation and maintenance strategy as part of the permit.
- Foul water flows were calculated from the British Standard BS EN 12056-2:2000, at 6.43 l/s for the visitor centre and 6.69 l/s for pond cottage and kitchen gardens.

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III. Appendix A: JUBB Drainage Layouts – 00500, 00501, 00502 & 00503

