XLINKS' MOROCCO-UK POWER PROJECT

Outline Operational Drainage Strategy

Document Number: 7.22
Document Reference: EN010164/APP/7.22
APFP Regulations: 5(2)q
November 2024
For Issue

Document status					
Version	**Purpose of document**	**Authored by**	**Reviewed by**	**Approved by**	**Review date**
For Issue	Application	JBN	Xlinks 1 Ltd	Xlinks 1 Ltd	November 2024

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Glossary

Term	Meaning
Q_{BAR}	Mean Annual Flood event (Typically a 1 in 2.2 year flood event)

Acronyms

Acronym	Meaning
DCC	Devon County Council
DEFRA	Department for Environment Food and Rural Affairs
DFWMG	Devon Flood and Water Management Group
FEH	Flood Estimation Handbook
LLFA	Lead Local Flood Authority
NPPF	National Planning Policy Framework
SuDS	Sustainable Drainage Systems

Units

Units	Meaning
ha	Hectare (area measurement equating to 10,000 metres squared)
l/s	Litres per second
m^2	Metres squared

1 OUTLINE DRAINAGE STRATEGY

1.1 Introduction

1.1.1 Pick Everard have produced this Outline Operational Drainage Strategy to describe the various elements that would be included in the Operational Drainage Strategy for the proposed Converter Site in Alverdiscott, Devon. The Operational Drainage Strategy would be submitted in accordance with this Outline Operational Drainage Strategy and approved by the relevant local planning authority prior to the commencement of works at the Converter Site.

1.1.2 This Outline Operational Drainage Strategy is intended to identify the strategy for the various drainage elements across the site that would be introduced into the design and explain how they would be formed as part of a future detailed drainage strategy.

1.2 General

1.2.1 The Operational Drainage Strategy should adhere to the guidance set out in the National Planning Policy Framework (NPPF) and best practice guidance which requires all surface water to be managed so that flood risk both on site and to third parties is not increased and where possible flood risk should be reduced if it is currently present on site.

1.2.2 It would also ensure that pollution to watercourse and groundwater from daily operation of the Proposed Development is minimised as far as is practical. This would include for the separation of hydrocarbons as well as the disposal of contaminated water from fire suppression operations in the event of a fire, this is further outlined in Section 1.8.

1.3 Surface Water Design

Guidance and Policy

1.3.1 Based on the latest best practice guidance and policy, the surface water system would have an appraisal undertaken to confirm the most suitable and sustainable method for managing surface water runoff from the development, in accordance with the DCC SuDS Hierarchy which states:

- Discharge into the ground (infiltration);
- Discharge to a surface water body (with written permission from the riparian owner);
- Discharge to a surface water sewer, highway drain, or other drainage system (with written permission from South West Water Ltd., Devon County Council Highways, or the riparian owner, respectively);

- Discharge to a combined sewer (with written permission from South West Water Ltd.).

1.3.2 In order to assess the suitability of proposed options, an investigation of the ground would need to be conducted in the fields where the site is proposed to confirm whether infiltration is possible, however, given the topography of the existing and proposed site, visible groundwater and a nearby watercourse, it is unlikely that infiltration into the substrata is feasible.

1.3.3 Therefore, it is likely that the proposed method of discharge for the site would be to make a controlled surface water discharge to the existing drainage ditches within the site boundary, meeting the second most acceptable solution in the hierarchy above.

Sustainable Drainage Systems (SuDS)

1.3.4 SuDS are a control measure to manage water as close to its source as possible. Wherever possible, a SuDS technique should seek to contribute to each of the four goals below with the favoured system contributing significantly to each objective:

- Reduce flood risk to the site and any neighbouring areas.
- Reduce pollution leaving the site.
- Provide landscape and wildlife benefits where possible.
- Provide amenity space to the development

1.3.5 There are several SuDS mechanisms that can be adopted which can be designed to slow down the peak flow rate of the overall volume of water leaving the site. Table 1 includes some examples of SuDS systems that would be considered for use in the detailed design of the Surface Water Drainage. The Proposed Development will be completed in accordance with DCC's SuDS Guidance for Devon 2023.

Table 1: Potential SuDS systems for consideration during detailed operational drainage design

SuDS Systems	Description	Source/Site Control?
Infiltration/attenuation basins, ponds and wetlands	Depressions in the ground that are utilised for surface runoff storage and also provide high potential for ecological, aesthetic and amenity benefits.	Site control
Swales	Vegetated channels used to convey rainwater, which remove pollutants and may permit infiltration in permeable soils.	Site control
Infiltration trenches	Gravel-filled channel which conveys flows, sometimes with a perforated pipe at the base to outfall to a receiving waterbody.	Site control
Soakaway	Gravel-filled pit which water is piped into so it drain slowly out	Source control

SuDS Systems	Description	Source/Site Control?
	into the surrounding permeable soil	
Soft Landscaping	Planted vegetation and green space used to increase the permeable area of the site and promote infiltration and interception of rainfall.	Source control
Filter strips	Vegetated areas of gently sloping ground alongside impermeable areas which remove pollutants and promote infiltration/evaporation.	Site control
Permeable paving	Paving that allows infiltration of rainwater either to the underlying soil (permeable sites) or permeable sub-base (impermeable sites).	Source or site control depending on design
Rainwater Harvesting/Butts	Collects water from roof runoff for re-use in site landscaping, potential cooling and dust control.	Source control
Infiltration/Attenuation tanks	Below-ground tanks used to store attenuated flows, to be gradually released with controlled discharge into the nearby watercourse.	Site control

Climate Change

1.3.6 In accordance with the UK Government's Department for Environment Food and Rural Affairs (DEFRA), for the North Devon management catchment a climate change uplift of 50% should be added to the design rainfall data for the 1 in 100 year event used for the Proposed Development in the Surface Water Drainage system. The discharge rate generated from the site would be subject to approvals from the Lead Local Flood Authority (LLFA) which in this case is Devon County Council as part of the Devon Flood and Water Management Group (DFWMG).

Discharge Rates

1.3.7 The existing site is currently undeveloped land which was previously used for agriculture, as such, any Proposed Development should control surface water runoff on-site and maintain a controlled discharge rate to the existing watercourse at greenfield runoff rates. The greenfield runoff rates should be calculated using Flood Estimation Handbook (FEH) catchment data to determine the rainfall intensity of the site for the various storm return periods. In accordance with best practise the discharge rate should be limited to the following hierarchy:

- The greenfield Q_{BAR} rate.
- If the Q_{BAR} rate is less than 2.0l/s/ha, a limiting discharge rate of 2.0l/s/ha should be used.
- If the overall discharge rate from the site is less than 5.0l/s then a discharge rate of 5.0l/s should be used.

1.3.8 Point 2 in the above hierarchy ensures that inconsistencies in the assumed soil types in the various modelling programmes do not negatively affect a site that has proven that soakaway is not practical for that site.

1.3.9 Point 3 in the above hierarchy ensures that small developments are not forced to utilise flow control units with insufficient discharge apertures that would contribute to increased flood risk due to an increased risk of blockages.

Layout

1.3.10 The surface water network would likely fall to the South-East, based on the topography of the site and the preferred outfall being the unnamed watercourse nearby. This should be controlled to the greenfield runoff rates as explained in 3.4 above, where any flows in excess of this rate, would likely be attenuated in some form of attenuation feature adjacent the flow control and watercourse. It is likely that there would also be further attenuation features further upstream in the site surface water drainage system to locally attenuate water.

1.3.11 The final layout of the Converter Site is subject to further detailed design which will include design of operational drainage features to control the discharge of water from the site. The final layout of the site will be a key contributing factor in determining the appropriate SuDS systems and drainage scheme within the Converter Site. The detailed design for the Converter Site requires approval by Torridge District Council in consultation with Devon County Council as the Lead Local Flood Authority.

1.3.12 The detailed design of the Proposed Development will be secured via the Requirement 4 of the DCO (Document Ref. 3.1), this will enable the finalisation and detailed design of the drainage networks across the Proposed Development.

1.4 Land Drainage Design

1.4.1 A Land Drainage system would be required to collect groundwater and runoff from any of the steeper areas of landscaping that would concentrate runoff into a point where flood risk could be increased. These would typically be in the form of a perforated carrier pipe in a stone trench at the base of the bunds and on the inside of the site adjacent to any retaining features such as the screening bund or platform separation running along the centre of the site.

1.4.2 Further ground investigation will be undertaken prior to the commencement of construction to provide supplementary information on the groundwater levels of the site. The land drainage would discharge without any flow control measures into the existing ditch as a separate, isolated drainage network. The ground investigation would be able to provide more information on the groundwater levels of the site and provide an approximation on the surrounding area, providing information on how the deep excavation required for the building platforms interact with these levels. This will inform the detailed drainage design.

1.4.3 The anticipated land drainage strategy for the Proposed Development will comprise of the following;

- Top Channel: Install a shallow, stone-filled crest channel to capture and divert water.
- Geotextile-Encased Toe Drain: At the base, use a geotextile-encased toe drain to relieve groundwater pressure and divert water away.
- Surface Drainage with Swales or French Drains: Swales along the sides of the bund, paired with French drains at strategic points, will manage surface and subsurface runoff.
- Erosion-Control Linings or Vegetation: Reinforce slopes with riprap, geocells, or turf mats to prevent erosion, supplemented by deep-rooted vegetation where possible.

1.4.4 The ground investigation will advise on anticipated ground water levels, which will inform the strategy to be implemented to offset the effects of the buoyancy forces from high ground water levels on the platform.

1.5 Foul Water Design

1.5.1 It is anticipated that the Foul Water network for the development would discharge via gravity to an underground septic tank that would be located in an area that has sufficient access for a tanker to empty the collected waste at intervals throughout the year. There are no foul water sewers in the vicinity of the development that would provide a suitable connection point for the foul flows, in addition, the anticipated flows from the site on a daily basis should be low enough that a septic tank is a suitable option for foul sewerage disposal.

1.6 Oily Water Design

1.6.1 When discussing “oily water” this is in reference to general contaminants expected on hardstanding through the passage and use by vehicles. The expected level of contaminant would be similar to that experienced by highways. It is anticipated these areas would drain through a separate sewerage system into a full retention petrol interceptor that would filter out the oils and discharge into the surface water system which would have an allowance for the associated surface water flows.

1.7 Oil Containment Design

1.7.1 Oil containment will be required where the risk of significant oil or contaminant spillage is identified, for example, in the vicinity of the transformers or in specified storage locations.

1.7.2 The Oil Containment drainage network will be separated from the wider drainage network, instead, in line with oil storage requirements set out by gov.uk, the bunding will be designed to contain 110% of the total contaminant capacity of the substance being contained.

1.7.3 Any spills will be wholly contained within the bunding and then removed by a licenced waster collector therefore posing no risk to the drainage network or downstream watercourses.

1.8 Fire Water Design

1.8.1 In the event the sprinklers are activated due to a fire within the Proposed Development, the surface water drainage system would have an automatic diversion to a below ground tank to account for the flows of water that contains waste materials generated from the fire. The volume of this tank would be calculated in accordance with best practice and guidelines to ensure containment and safe removal after the event.

1.9 Exceedance Flow Routes

1.9.1 In the event that the capacity of the drainage network is exceeded due to rainfall storm events in excess of the design event or due to blockages within the drainage network, an analysis of the overland levels and the route of the excess water would be provided as part of the detailed design for approval, to give surety that these flows do not affect neighbouring properties downstream of the

discharge point or equally as important, the operational capability of the drainage system on the Converter Site. If deemed necessary these exceedance routes could either be informal i.e. across landscaping or across surfaces such as tarmac, alternatively they could be formalised for their intended duty such as concrete channels through landscaping areas to divert water from areas that must be kept free of water.

1.9.2 This excess water should be directed to a point where it would not cause adverse effects to neighbouring properties, as this water would be in excess of the design storm it is not anticipated that this water would be controlled when determining flow routes to the local watercourse due to the difficulty in determining the upper limit of storage and therefore discharge rate.

1.10 Operation and Maintenance

1.10.1 An Operation and Maintenance Manual would be produced prior to operations which would outline the correct ways to maintain the different elements of the proposed drainage network and who will be responsible for them.

1.10.2 In broad terms, there should only be two parties that would be responsible for maintaining an operational system which would be:

- The Operational Management team or an appointed Management Company.
- The landowners of the ditch where this runs through their land until it becomes the remit of Devon County Council.