Outline Drainage Strategy

Hardstandings

In its consultation response the Environment Agency suggested the possibility of routing the majority of the surface water from hard standing areas to a ditch on the western boundary of the creek, in order to allow it to form a wetland and discharge to the tidal creek around the northern corner of the site.

This has been reviewed and is not considered to be viable. The area of land to the west of the creek is required as a reptile translocation area (see ES Appendix 7.5 for further details).

The proposed drainage strategy provided below has been further developed by GHA Livigunn in consultation with the Environment Agency, MVV, Kier Construction and URS Scott Wilson. In particular the Environment Agency expressed a requirement for a first flush system to provide a level of treatment to hardstanding runoff – potentially containing hydrocarbons – before being discharged into the adjacent watercourse. The main part of the site on which the EfW CHP facility will be constructed currently lies at approximately 7.00m AOD and in order to keep excavated material on site it is proposed to raise the ground to a level of 9.00m AOD. This raising of the site requires engineered embankments to give stability to the approximately 2 in 1 slopes to the majority of the site's perimeter. Taking this with the requirement for roads to access the various parts of the EfW CHP facility, space at the site is at a minimum for drainage features. A drainage layout provided by GHA Livigunn but drawn by URS Scott Wilson is provided in the Drawing PA21 Revision E.

It is proposed that lengths of swales to the access road local to the gatehouse and weighbridge structures be provided. It is this area that will see the majority of the traffic movements.

It is proposed that a roadside granular filter drain, linked to the main site drainage, be provided to the south of the main building and the east of the workshop and maintenance areas. This drain will also receive water from the slopes of the higher 'table top mountain'. Therefore, a slotted drain linked to the main site drainage will be provided to ensure no flooding in storm events.

It is proposed to drain the hardstanding area to the north of the site to an infiltration basin topped with topsoil and grassed to keep the landscape proposals as existing. This basin will have a storm overflow draining to the ecological pond storm spillway, again ensuring no flooding on site.

The area to the west of the main building is similar to the east side in that quite steep slopes will be required to accommodate the 2m level build up therefore what can be achieved in this area is very limited. It is also not desirable to have hardstanding runoff entering the swale / pond system proposed along the foot of Blackies Wood, since the primary purpose of that is ecological not drainage. A hard piped drainage system is therefore proposed for the area to the west of the main building.

The surface water will pass through a Class 1 by-pass petrol interceptor (estimated size at this stage NSB20 – to be confirmed at detailed design stage) prior to being discharged to the tidal estuary of the river Tamar. The location of the outfall has been moved slightly north adjacent to the proposed new bridge abutments. This allows for construction activities to take place as the construction programme whilst minimising works to the existing banks. The outfall structure complete with adequate flow calming measures and scour protection will be provided at the point of discharge. The invert level of the outfall pipe at the point of discharge will be set such that it is above the maximum tidal water level for a 1 in 200 years return period (i.e 4.48 m AOD - note that this level already includes an allowance for climate change

and a 300 mm freeboard). Consequently the design of the surface water system will be based on free discharge flow conditions.

Please note that it is intended to provide an emergency cut-off valve immediately upstream of the outfall such as to prevent any water discharging to the environment in the event of an accidental spill on site.

Roof and Walls

It is proposed that all of the run-off from roofs and walls will drain to an infiltration trench/swale (see Drawing PA21 Revision E). The infiltration trench/swale will connect to the proposed (lined) wildlife pond and an outlet from the pond to the Barne Brake Creek will be provided. Under normal rainfall conditions, the infiltration trench/swale will act as a soakaway with rainwater infiltrating to the ground. During periods of higher flow, the flows will link to the wildlife pond and will then discharge to the Barne Brake Creek; this will provide for storm events including the 1 in 100 years return period event (including 20% climate change).

A short length of the swale will need to be culverted due to existing elevated ground levels and trees (see Drawing PA21 Revision E).

Design Conditions

The design of the drainage system is based on the following performance criteria:

- Design return period of 1 in 30 years: No surcharge in the system is allowed.
- Design return period of 1 in 30 years including an allowance of 20% for climate change: Surcharge of pipe work is allowed but no surcharge of the manhole and no flood risk.
- Design return period of 1 in 100 years including an allowance of 20% for climate change: Surcharge of the manhole is allowed and flooding is allowed locally.

At this stage, preliminary sizing calculations have been carried out for both system and the results are presented below:

Hardstanding

The total contributing area is in the order of 11000 m^2. The expected peak flows are 249 l/s for a 1 in 30 (including 20% climate change) and 298 l/s for a 1 in 100 (including 20% climate change).

Roof and Walls Run-off Rain Water

Within these preliminary calculations, a rate of infiltration of 0.7 m/hr has been considered. The description of the made ground material indicates a gravel/sand type of ground. Typical infiltration values for these type of soils range between 0.1 m/hr to 10 m/hr for sands and 10 m/hr to 1000 m/hr for gravels which tend to indicate that the infiltration value used is realistic and could be viewed as conservative. A regime of infiltration tests will be carried out on site to confirm the value to be used at detailed design stage. The ground water table is significantly affected by the tides, however, the anticipated top ground water level is circa 5 m below ground level. This is considered sufficiently low to allow infiltration to be considered.

The maximum volume flowing to the wildlife pond in a 1 in 30 years return period and 20% climate change is approximately 380 m^3 (assuming no infiltration to ground) . In normal operations a large proportion of this volume will naturally infiltrate to ground via the infiltration trench/swale; a proportion of the volume (to be determined upon detailed design) will flow to the wildlife pond. An outlet will be provided which will direct

flows to the Barne Brake Creek (an approximate peak flow of 40 l/s will be discharged at the outlet). Flows from 1 in 100 year storm events will discharge in a similar manner through the outfall to the creek.

The infiltration trench/swale will link to the wildlife pond and an outlet to Barne Brake Creek will be provided. Porous material will be provided in the infiltration trench/swale over a depth of 1.5m. Preliminary estimates suggest that the size of the infiltration trench/swale will be approximately 1m wide, 2m deep and 150m long; this will be confirmed at detailed design stage.