
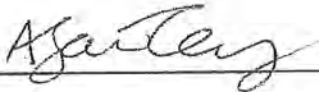



BRADWELL SITE

PROPOSED CHANGES TO CURRENT ACTIVITIES

BRAD/EN/REP/105

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This report addresses question 2b 'Changes or additions to existing activities' on form Part C2 – General – varying a bespoke permit. The two key proposed changes in the activities of the current permit include:

- Permission to continue to make discharges beyond the current 12 month period for FED related effluent through the existing route for a further 24 months; and
- Permission to discharge FED related effluent through a new discharge line when it is required.

The risk assessment for the continued discharge through the existing route remains unchanged, however, a new risk assessment has been prepared for discharges through the new pipeline. The effluent treatment process will be unchanged.

Over time the inlet and outfall culverts have been silting up and now present a risk of preventing discharges to the Blackwater Estuary. To help illustrate this, images from the 2014 multi-beam echo sounder survey undertaken by the Port of London Authority have been included in Appendix A. As mitigation, the site has installed new discharge line which will be connected to the site effluent discharge lines when it is needed.

The design of the new discharge line was informed by modelling undertaken by HR Wallingford to ensure optimum dispersion. This work is summarised in BRAD/EN/REP/082 FED Discharge Outfall EBR4908-RT008-R01. The recommendations from this report were incorporated into the design and included:

- an outfall port of diameter 0.065m;
- discharged horizontally;
- raised 5.5 m above the sea bed, but always submerged; and
- angled offshore, perpendicular to the tidal current direction.

The new line installed comprises four 180mm diameter polyethylene pipes, with 65mm discharge nozzles housed in the existing East Outlet Culvert. To maximise dispersion, the discharge nozzles have been designed to achieve positive initial dispersion of the effluent as it enters the Blackwater Estuary. Overall, the discharge line is estimated to give an exit velocity of 3.3m/s and a densimetric Froude number of approximately 14, which is associated with rapid turbulent mixing. Appendix B provides an as built drawing of new line and discharge ports.

Treated FED effluent and general treated radioactive effluent arisings will be discharged through one of the lines, with treated non-radioactive effluents and site drainage being discharged through the remaining lines.

The abated FED effluent will be pumped from the final delay tank by pumps rated at 40m³/hr, giving a maximum of 20m³ during the discharge window of half an hour. Discharge will be made within an optimum discharge window commencing from High Water plus 1 hour to High Water plus 2.5 hours. This will ensure that dispersion is optimised.

With this arrangement, there will no longer be pre-dilution from the carrier water that is part of the existing discharge arrangements for FED effluent as authorised under Environmental Permit EPR/DP3127XB.

As a result of the need to use the new discharge line at some point in the future, a variation is required to the Environmental Permit EPR/DP3127XB. The site is seeking the variation to include provision for the existing permit descriptions and conditions to be maintained until discharges need to be made through the new line. At this point, only the descriptions, limits and conditions specified for the new line are to be effective. The proposed date for the current arrangements to end is 31st December 2016 and the date for the new arrangements to come into place is 1st January 2017. Should the proposed dates change, the site will advise the Environment Agency as soon as possible on when the switch from the current permit limits and conditions to those specified for discharges made through the new line are required. Table 1 summarises the current activities and proposed changes to the site's discharge arrangement.

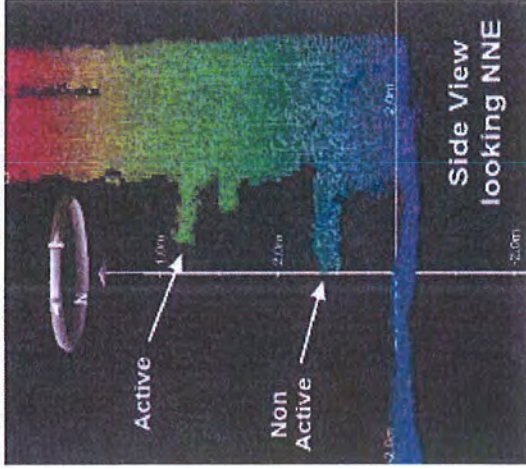
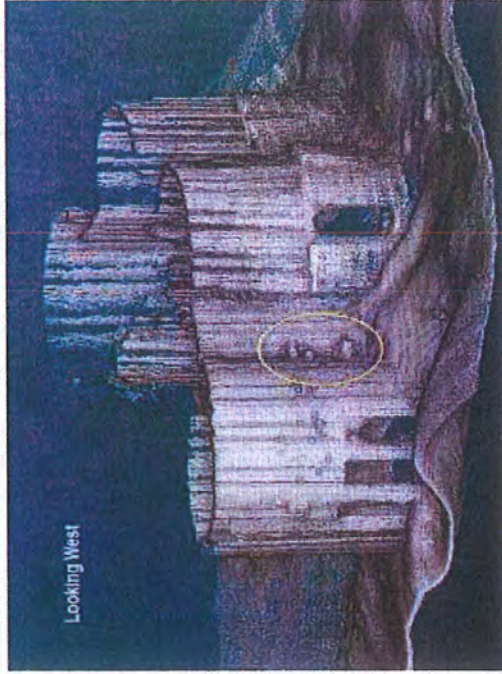
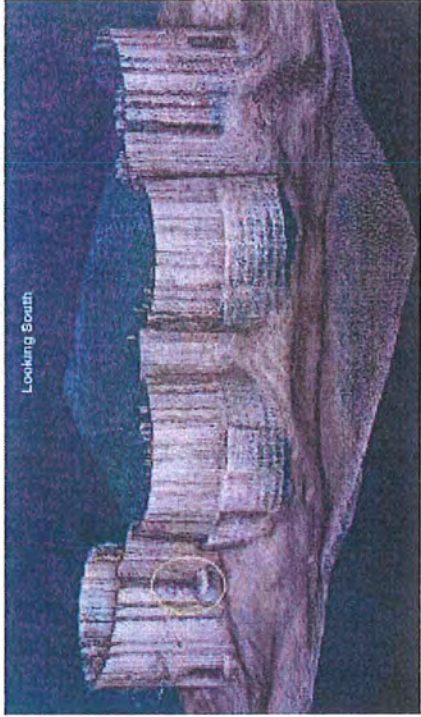
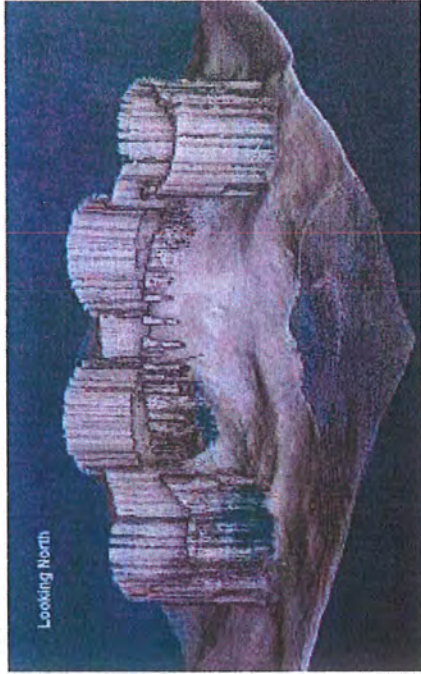
Table 1: Current activities and proposed changes

Parameter	Current Activity	Proposed Changes
Discharge period	The discharge takes place over 30 minutes each day during the first 90 minutes of the ebb tide for a 12 month period.	The discharge will take place over 30 minutes each day during the first 90 minutes of the ebb tide.
Discharge Window	Discharge takes place over 30 minutes each day during the first 90 minutes of the ebb tide (HW to HW+1.5)	Discharge will be made for approximately 30 minutes each day within the optimum discharge window of one hour after High Water to two and half hours after High Water (HW+1 to HW+2.5)
Maximum daily discharge volume	Maximum daily discharge is 30m ³ /day	Maximum daily discharge is 20m ³ /day
Maximum rate of discharge	16.7 litres per second	11.11 litres per second
Monitoring Point NGR	TM 00060 08880	TM 00288 08797

In addition to the proposed changes mentioned in Table 1, the general update of the existing permit should take account of changes in legislation (e.g. Schedule 3 B List 1 General Standards, table to be removed due to repeal of Dangerous Substances Directive by the revised Water Framework Directive (rWFD)).

The application considers the non-radiological physical and chemical properties of the FED effluent. The radiological characteristics of the FED effluent along with other radioactive effluents are regulated under Environmental Permit EPR/ZP3493SQ/V004. A separate application will be made to vary this permit. The non-radiological physical and chemical properties of the general radioactive effluents are regulated under Environmental Permit PR2TS/E10760CN/002. A separate application will be made to vary this permit.

Appendix A Images from a high resolution multi-beam echo sounder survey undertaken by Port of London Authority in 2014.



Discharge Ports

The images show build up of sand/silt around the outfall structure. Whilst there have been changes and increases since the previous survey, the trends are not as severe as previously seen. There has been a localised build up of sand/silt around the discharge ports. The FED &AE discharge nozzle is near 4 meters as opposed to the optimum 5.5 m from the sea bed. HR Wallingford have advised that the modeling is based on ambient height of the sea bed and the localized build up would not affect the modeling.

Appendix B – New discharge line

