



UNIVERSAL DESTINATIONS & EXPERIENCES UK PROJECT

Former Kempston Hardwick Brickworks
and adjoining land, Bedford

Appendix – M Flood Management Plan

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1 BACKGROUND OF PROJECT

1.1 PURPOSE AND SCOPE

- 1.1.1. This Flood Emergency Plan (FEP) provides the project-specific flood response arrangements relevant to the CEMP Works within the CEMP Land, including warning-level actions, evacuation routes, safe refuge areas and recovery steps.
- 1.1.2. The controlling requirements for temporary surface water management, flood-risk controls and related responsibilities are set out in Section L of the CEMP Main Body. This Appendix provides supporting flood-event actions, route/refuge information and supplementary examples of runoff treatment measures.

2 INTRODUCTION, SCOPE & OBJECTIVE

2.1 FLOOD RISK

- 2.1.1. The CEMP Land may be at risk of flooding from fluvial sources (including Elstow Brook), surface water (pluvial), groundwater and, in extreme events, other sources. The principal fluvial risk relevant to the CEMP Works is from Elstow Brook. Flood risk is expected to remain during the CEMP Period; therefore, the measures in this FEP will be implemented to protect CEMP Staff, vehicles, plant and the environment on and in the vicinity of the CEMP Land.

2.2 FLOOD WARNINGS AND FLOODLINE

- 2.2.1. The Contractor and Central Site Manager will monitor the Environment Agency and Met Office warning systems relevant to the CEMP Land and will act on warnings in accordance with the response actions set out in this Appendix. This Appendix focuses on the actions to be taken by the project team rather than restating the general operation of the national warning services.

2.3 ESTIMATED WARNING TIME

- 2.3.1. It is important to determine the estimated lead time between the Environment Agency/Met Office sending out a warning and the time flooding might occur, while also considering the cause/type of flooding, and the estimated duration of the flood.

2.4 COMMAND & CONTROL OF CEMP LAND IN A FLOOD EVENT

- 2.4.1. Flood response will be managed through the Site Controller governance arrangements, with the Central Site Manager coordinating tactical actions on the CEMP Land and the CEMP Works Site Manager implementing the required actions within the work areas and compounds. Emergency Services' instructions on the ground take precedence at all times.

2.5 PRE-FLOOD ACTIONS

- 2.5.1. The CEMP Works Site Manager will monitor relevant flood and weather warnings and will brief CEMP Staff where elevated risk is forecast. Where appropriate, early decisions may be taken to restrict activities, move plant/vehicles, or prevent CEMP Staff travelling to the CEMP Land.

3 RESPONSE ACTIONS

3.1 COMMAND AND CONTROL

- 3.1.1. Flood response will be managed through the Site Controller governance arrangements, using the Construction Logistics Provider (CLP) / Operational Support Centre (OSC) as the primary coordination and communications channel where applicable. The Central Site Manager will lead tactical control on the CEMP Land, with the CEMP Works Site Manager implementing the required actions within the work areas and compounds. Emergency Services' instructions on the ground take precedence at all times.

3.2 FLOOD RESPONSE MEASURES

- 3.2.1. Flood response measures based on the extent of flood risk are outlined in the sections below.
- 3.2.2. Measures applicable to all levels of flooding comprise the following:
- In the event of an evacuation, adhere to the procedure outlined in Section 3.6 of this document; and
 - All CEMP Staff on CEMP Land will be made aware of the situation during a flooding event.

3.3 FLOOD ALERT / YELLOW RAIN WARNING – PREPARE

- 3.3.1. The Environment Agency issue a 'Flood Alert' code if, based on the available information, flooding is possible, 2 hours to 12 hours in advance of flooding. The decision to do so will be liaised with the Site Controller
- 3.3.2. The Central Site Manager, based on the advice received from Flood Alerts, will take a decision on whether it is prudent to close and evacuate the premises will be taken by the Central Site Manager.
- 3.3.3. In the event of an evacuation please refer to **Section 3.6** of this document.
- 3.3.4. The following measures will be undertaken If it is decided to keep the premises open, the Central Site Manager will:
- Monitor local news and weather forecasts;
 - Keep in contact with Bedford Borough Council and the Environment Agency for information and advice including potential closure of the CEMP Land;
 - Be aware of water levels nearby; and
 - Be prepared to act on this FEP.
- 3.3.5. The Central Site Manager will endeavour to ensure that everyone on the CEMP Land is aware of the situation during a flooding event.
- 3.3.6. Regardless of whether the decision to evacuate is taken, at this stage it may be appropriate to move vehicles from the CEMP Land, if the local road network is not flooded. CEMP Land users will be notified that warnings are in place and that evacuation may be necessary.
- 3.3.7. If road networks and surrounding walkways have been inundated with water, the safest and appropriate decision should be to seek refuge within the West Gateway Zone and Core Zone where flood risk is lowest. Details on a place of safe refuge can be found in Section 3.7.

3.4 FLOOD WARNING / AMBER RAIN WARNING – ACT

- 3.4.1. The Environment Agency issue a 'Flood Warning' code when water levels are rising and are expected to rise further (e.g., due to more rain being forecasted). The 'Flood Warning' is issued 30 minutes to 2 hours in advance of flooding.
- 3.4.2. Closing the CEMP Land is likely to be appropriate at this stage and a decision will be taken by the Site Controller based on the advice received.
- 3.4.3. If it is decided to keep the CEMP Land open, the Central Site Manager will review the actions in the Flood Alert section above.
- 3.4.4. If it is decided to close the premises, the Central Site Manager will:
 - Switch off any sources of electricity and gas where possible;
 - Switch off and secure any machinery and equipment on CEMP Land;
 - Deploy any flood defences measures where relevant;
 - Evacuate the CEMP Land in accordance with Section 3.6 of this document;
 - In the event that an evacuation cannot be carried out safely due to a lack of warning time or increasing water levels in the surrounding area, it is essential that CEMP Staff follow Section 3.7 of this document and find safe refuge in the Core Zone and West Gateway Zone; and
 - Endeavour to ensure that everyone within the CEMP Land is aware of the situation.

3.5 SEVERE FLOOD WARNING – SURVIVE

- 3.5.1. The Environment Agency issue a 'Severe Flood Warning' code when flooding poses a significant threat to life through the gov.uk website and Floodline Warning Direct. Widespread flooding of large areas is possible at this stage.
- 3.5.2. A 'Severe Flood Warning' status is not always preceded by a 'Flood Warning' or 'Flood Alert' status.
- 3.5.3. Closing and evacuation of the CEMP Land is likely to be appropriate at this stage, and a decision will be taken by the Site Controller based on the advice received.
- 3.5.4. If it is decided to keep the CEMP Land open, the Central Site Manager will review the actions in the 'Flood Alert' section above and continue to monitor the situation.
- 3.5.5. If it is decided to close the premises, the Central Site Manager will adhere to the procedures listed in Paragraph 3.3.4 above.
- 3.5.6. It is possible that by the time a 'Severe Flood Warning' is in place, water is already flowing onto land surrounding the CEMP Land. If this is the case, an evacuation is not recommended. In the event that an evacuation cannot be carried out safely due to a lack of warning time or increasing water levels in the surrounding area, it is essential that CEMP Staff follow Section 3.6 of this Plan and proceed to the designated safe refuge areas.

3.6 EVACUATION ROUTE

- 3.6.1. If an evacuation and closure of the CEMP Land before flooding is the option decided on by the Site Controller, this will need to be undertaken following the advice of Bedford BC and potentially the Emergency Services.
- 3.6.2. While evacuating, extra care will be taken with vulnerable people because even shallow water along the route could be dangerous.

- 3.6.3. When the evacuation route contains water, the following notes will be considered before and during an evacuation to remain safe:
- Never attempt an evacuation towards surrounding flooded roads, unless specifically instructed to do so by the emergency services, as the depth of water there could be dangerously high;
 - Do not walk or swim through any flowing water as currents can be deceptive. It is very possible to get swept away or struck by an object in the water;
 - Avoid contact with floodwater wherever possible. It may be contaminated with sewage, oil, chemicals, or other substances; and
 - If CEMP Staff must walk through floodwater, it is recommended that they try and assess ground before standing on it, using a pole or stick to ensure that you do not step into hidden deep water.
- 3.6.4. The evacuation routes for each zone relevant to the CEMP Works are shown in **Figure 3-1: Evacuation Routes** below.
- Core Zone:
 - Option 1 – Travel south-east onto Broadmead Road. Follow Broadmead Road south towards the roundabout. Exit the roundabout into the village of Stewartby.
 - West Gateway Zone:
 - Option 1 – Travel north along Broadmead Road. Turn right onto Woburn Road. Take the second exit at the roundabout onto Fields Road and cross over the A421 into the village of Wootton.
 - Option 2 – Travel south-east onto Broadmead Road. Follow Broadmead Road south towards the roundabout. Exit the roundabout into the village of Stewartby.

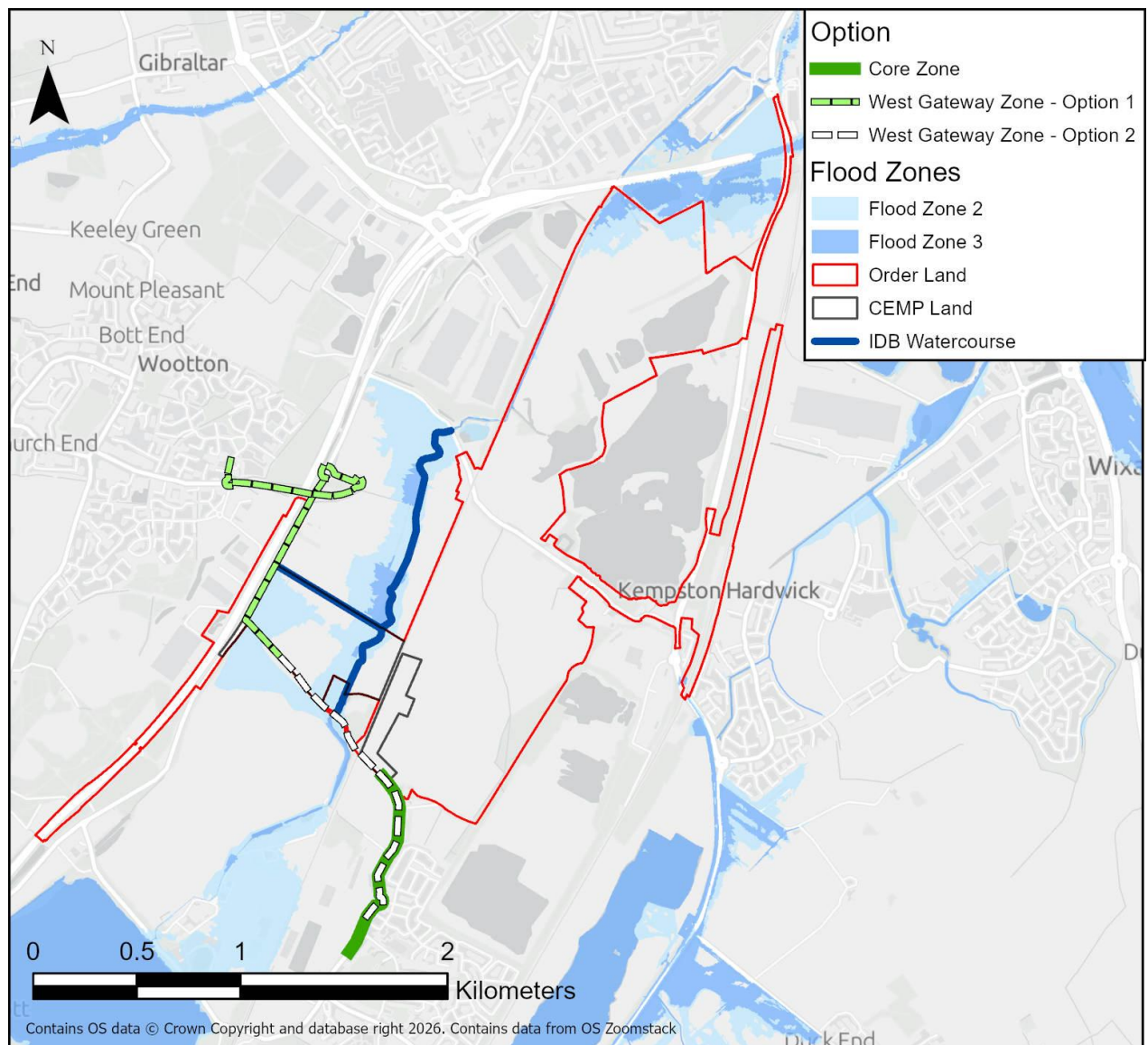


Figure 3-1: Evacuation Routes

3.7 SAFE REFUGE

If evacuation of the CEMP Land is not possible, CEMP Staff will move to the designated safe refuge areas shown in Figure 3-2 - Safe Refuge Zones

3.7.1. where flood risk is lower.

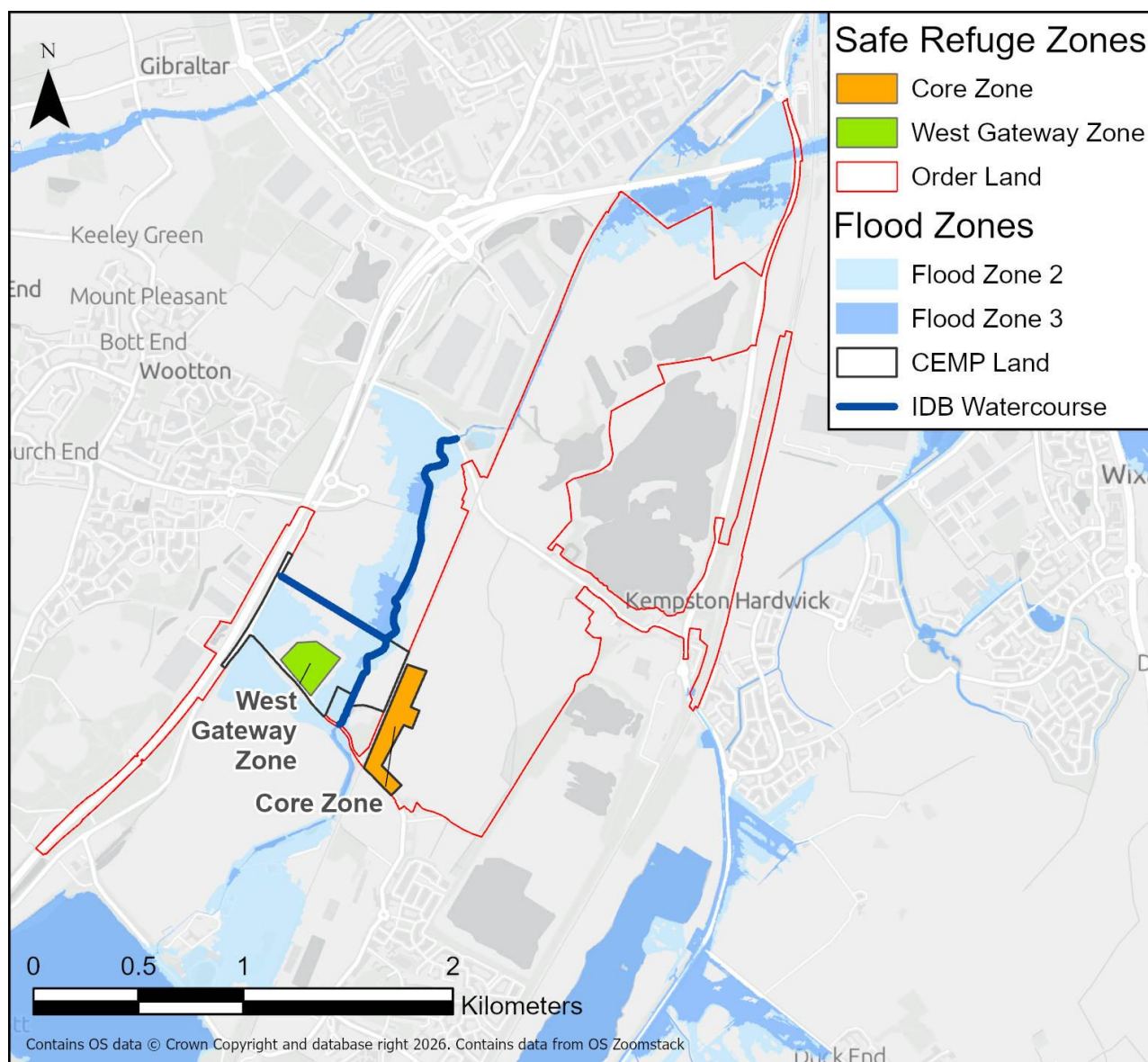


Figure 3-2 - Safe Refuge Zones

3.7.2. During the CEMP Works, the Central Site Manager will ensure that arrangements are in place to assist CEMP Staff who may require support (e.g. those with limited mobility) to reach the designated safe refuge areas. These arrangements will include identifying accessible routes to safe refuge, assigning responsible persons/marshals to provide assistance where required (including a buddy/escort approach where appropriate), and providing suitable means of transport or assistance (e.g. a site vehicle) where walking to refuge is not practicable. The arrangements will be briefed to CEMP Staff as part of induction and refreshed where required.

3.8 REOCCUPATION OF THE LAND

- 3.8.1. A 'Warning No Longer in Force' code will be issued when no further flooding is expected in the area. Warnings are no longer in force when river or sea conditions begin to return to normal.
- 3.8.2. Following issue of this code, the Central Site Manager will contact Bedford Borough Council to obtain confirmation that the situation has returned to normal and, in case of evacuation, that it is safe to return to the CEMP Land.
- 3.8.3. There may well be environmental hazards, loss of utilities, and other such issues which need to be rectified before people are allowed back to the premises. The Central Site Manager will therefore consider a range of measures in developing a Recovery Plan.
- 3.8.4. CEMP Works Site Manager will also:
- Keep monitoring weather reports and, in case flooding has happened:
 - Take additional care of hidden dangers in the floodwater (e.g., sharp objects, raised manhole covers, and pollution);
 - Take additional care as floodwater may have caused damage to onsite structures;
 - If structures or belongings are damaged, contact the Promoter's insurance company;
 - Ask the insurers' advice before starting to clean up and take photographs of the affected assets/structures/items before taking any action (to avoid any claim issues);
 - If the electricity supply is not already switched off at the mains, get a qualified person to do this. DO NOT touch sources of electricity when standing in floodwater; and
 - DO NOT switch the power and gas on if in doubt that services and appliances may have been affected by floodwater. Seek professional advice if necessary.
- 3.8.5. Entrances to the CEMP Land and car parking areas may have been affected. If closure of car parks has been carried out, any vehicles still in the car park upon the onset of flooding must remain there until flooding recedes.
- You should not drive through a flooded area as it is difficult to see abrupt drop-offs, deep areas, and surcharged manholes/manholes with missing covers.
- 3.8.6. Guidance on helping recovery after a flood can be found at <https://www.gov.uk/after-flood>.

4 DOCUMENT CONTROL

- 4.1.1. Contractor will be responsible for reviewing and updating the FEP to ensure it remains effective throughout the construction of the CEMP Works. The FEP is to be reviewed six monthly, and/or:
- After an event or exercise which has resulted in lessons learnt;
 - Following major changes of personnel or policy; and
 - Following any change to the flood risk or warning process.
- 4.1.2. As part of the FEP annual review, the contacts list and website links will be checked and, if necessary, updated.
- 4.1.3. The Central Site Manager will prepare and maintain flood kits, which should contain items useful in case of an emergency. The flood kits will be easily and readily accessible in case of flooding, ideally within each zone.
- 4.1.4. The kits will be stored at high level inside in the compound area shown in **B(1) Stage 1 Compound** and **B(2) Stage 2 Compound**. Kits will include the following, as a minimum:
- Torches;
 - A sufficient supply of bottled water;
 - A portable radio with batteries or a wind-up radio;
 - First-aid kit;
 - A list of useful contacts; and
 - This FEP.

5 SURFACE WATER MANAGEMENT

5.1 ENVIRONMENTAL ASSESSMENT CONTROL APPROACH

- 5.1.1. The controlling requirements for temporary surface water and runoff management are set out in **Section L** of the CEMP Main Body. **Table 5-1** in this Appendix provides supplementary examples of standard and additional treatment / control measures that may be used where required for the CEMP Works.
- 5.1.2. Settlement testing of representative clay-rich runoff indicates that physical settlement alone may not achieve adequate clarity for discharge. Accordingly, runoff generated by earthworks and haul routes will be managed through a treatment train that combines settlement/storage with chemical flocculant dosing where required, together with solids capture and routine maintenance of treatment areas.
- 5.1.3. The default approach during the CEMP Works will be:
- Intercept and convey runoff via temporary grips/swales and controlled flow pathways to settlement/attenuation features;
 - Provide settlement/attenuation ponds/lagoons (or equivalent) to promote sediment deposition;
 - Apply flocculant dosing where required to enhance settlement performance, with dosage controlled and adjusted to suit runoff conditions; and
 - Prevent untreated discharge to watercourses, with any discharge controlled and managed in accordance with applicable consents/permissions.
- 5.1.4. Where higher turbidity or high suspended solids are encountered, additional solids capture/maintenance provision will be implemented (e.g. dedicated capture areas and increased maintenance frequency) to maintain treatment effectiveness.
- 5.1.5. Where treatment performance is not sufficient for safe discharge, runoff will be retained for further treatment and/or removed for off-site disposal by an appropriately authorised contractor, as necessary.
- 5.1.6. **Table 5-1** summarises the standard controls to be implemented as a minimum and additional measures to be implemented where required by conditions and risk.

Table 5-1 – Surface water and runoff controls (standard and additional measures)

Fabric silt fences	These are geotextiles installed in the path of sheet flow runoff to filter out sediment. They are often installed around water bodies, below the toe of a cleared slope or around temporary earth stockpiles. Silt fences detain sediment-laden water and promote settlement and filtration of suspended solids in runoff.
Measures to control rate of temporary discharge	If the rate and energy of temporary discharges are not controlled there is a risk of erosion of the bed and banks of the receiving water body. The use of baffle pads or boulders below the outfall can both ways in which the energy of the outfall can be dispersed to avoid bank and bed erosion.
Earth bunds	These are temporary barriers to conveyance of construction runoff and can be used to create temporary storage lagoons or barriers between

	<p>construction works and water bodies. Care needed as earth bunds themselves can be a source of fine sediment, although this can be minimised by covering with a suitable geotextile or seeding if they are to be in place for a longer period of time and not part of topsoil storage.</p>
Drainage grips	<p>Drainage grips (otherwise known as cut-off or temporary drains) are temporary drains installed to intercept runoff from slopes above construction works to prevent it entering the site or cleared slopes within the site itself. They are an effective way to temporarily manage surface water runoff and convey flows contaminated with fine sediment to storage and treatment areas. Gravel and straw bale check dams can be created at regular intervals to encourage fine sediments to settle out during conveyance.</p>
Sand bags	<p>Sand bags provide a flexible way to prevent sediment-laden runoff entering a watercourse by creating temporary dams and barriers to runoff. This is most effective on the face of temporary watercourse crossings and short lengths of land depressions where there are preferential flow pathways.</p> <p>Like fabric silt fences and sand bags, straw bales are a multipurpose way to manage construction site runoff to prevent untreated ingress to water bodies and to support the filtration of fine particulates from runoff.</p>
Vegetated buffer zone	<p>Vegetated buffer zones protect water bodies by providing a separation between the water body and the area of construction works and a means by which any overland flows can be treated before it drains to the water body. When planning the works a Contractor should minimise the area of vegetation clearance, especially around water bodies to maintain natural buffer zones.</p>
Silt curtains	<p>Floating silt curtains are designed to control and manage sediment flow within standing waters. It consists of a top flotation pocket below which is suspended vertically an impermeable curtain, and then a ballast at set intervals to hold the curtain in place. It is typical for a bespoke curtain to be created for the particular water body (i.e. changes in bathymetry, flow conditions can be taken into account). Similar products exist for use in low river flows, although they are less effective than when deployed in calmer water.</p>
Conveyance swale	<p>Similar to drainage grips, conveyance swales provide a way in which construction site runoff can be directed to storage and treatment areas. The wider cross-sectional area of a swale when compared to a drain encourages greater settlement of fine particulates. Settlement can be enhanced by the inclusion of</p>

	check dams and sediment traps, although the build-up of deposited fine material will need to be monitored and regularly cleared out.
Silt bubble barriers	Bubble barriers are tubes deployed on the bed of the watercourse which emit bubbles. They can control movement of silt in the additional advantage of delivering an oxygen-enriched environment. Without this, silt plumes can raise oxygen demand in the waterbody, thereby causing stress to aquatic organisms. They can also be used for general aeration of lakes and ponds
Silt Mats	<p>Silt mats are used to capture sediment as it drops out of suspension and should be located in areas of natural deposition where water energy is low. They are typically staked to the bed and have a natural fibre matrix to contain sediment effectively and prevent resuspension.</p> <p>Silt check dams are also available (e.g. wood waste fibre media or rocks) within netting. They are used to reduce speed of flow in ditches and swales, and distribute flows across the channel.</p>
Pumps, settlement tanks	Pre-treatment of construction site runoff can be provided by first pumping runoff through a settlement tank. These work by gravity to encourage fine particulates to settle out and become trapped at the bottom of the tank. Gravel levels of treatment can be achieved by using lamella clarifiers that include a series of inclined plates to provide a larger effective settling area for a small footprint. There are a range of products depending on application and flow rates, and these can also be deployed in series and with chemical dosing tanks, if required.
Temporary settlement lagoons	Temporary settlement lagoons are an effective way to remove suspended particulates from construction site runoff by storing water and allowing the suspended solids to settle out. Where high concentrations are expected, a long retention time is required (or significant use of the weir is required). The storage volume required depends on site requirements, character of the sediment, and the duration of works.
Chemical treatments and dosing tanks	Where required to achieve effective treatment performance, chemical dosing will be used in conjunction with settlement/attenuation features to enhance removal of suspended solids (and, where relevant, associated contaminants) prior to any discharge. Dosing systems will be managed to minimise spill risk, with chemicals stored and used in controlled, contained arrangements and operated in accordance with the Contractor's procedures. Dosage will be adjusted to suit runoff conditions, and treated water will be retained for further treatment or removed for off-site disposal if treatment performance is not sufficient.

Tanker for off-site disposal	Where it has not been possible to adequately treat construction site runoff there remains the option to pump the runoff out to a tanker for disposal off-site at a suitably licensed waste facility.
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