John F Hunt
REGENERATION

Surface Water Management

Guidance Document for Construction

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1. Pollution Prevention
A Company Wide Responsibility

The mismanagement of a company's operational activities can have a significant detrimental impact on the quality of our inland waterways.

Frequently, it is perceived that the risk of causing a pollution event and any subsequent consequence is a matter for the operational side of the business. However, pollution needs to be viewed as being a company wide responsibility shared by all.

Historically (Pre-2014) the dominant force that drove a Company's awareness of the need to prevent pollution from occurring was public perception, fuelled by the actions of pressure groups such as Friends of the Earth and Greenpeace.

In 2014 the Privy Council issued guidance to judges: Environmental Sentencing Guidelines - Click Here to read in full.

The purpose of these guidelines was to develop a consistent approach to setting fines. This was to ensure that the fines acted as a true deterrent and to allow the claw back of any financial benefit that the company might have gained by not protecting the environment.

Tesco hit with major £8 million fine for pollution incident

https://www.gov.uk/government/news/tesco-hit-with-major-8million-fine-for-pollution-incident

Since the introduction of the Environmental Sentencing Guidelines, the level of fines handed out for water pollution has increased from a low level to a high level, reflecting the environmental damage that polluted water can cause when released into the environment.

2. Why Water Pollution Prevention Matters

A company who fails to plan for the presence of excess surface water and/or groundwater that it needs to discharge, can suffer harm to their business via a variety of mechanisms. For instance:

- Project Risks and Programme Delays
- Fines and Criminal Sanctions
- Brand Damage

A company who manages its activities to lower the risks associated with water pollution, enables cost-effective, successful and profitable operations.

2.1 Project Risks and Programme Delays

Failure to plan in advance for the disposal of a site's excess surface water can cause project cost overruns and program delays.

Programme Delays:
The discharge of excess water into the environment requires a consent to be in place before the discharge can commence. Obtaining the consents take time. For example:

Where the discharge is made into Controlled Waters (Groundwater or Surface) the Environmental Regulator (EA, NRW, SEPA) may require an Environmental Permit (Construction Licence in Scotland) to be in place. The process of agreeing the permit may take 6 months or more to obtain.

Cost Overruns:
In respect of the costs of treating excess site water, the main drivers are:

- Volume and rate that the water is to be treated (Size of treatment system)
- The location into which the water will be discharged
- Treatment standard that needs to be achieved (How clean does the water need to be)
- Chosen method of treatment

Obviously costs of water treatment increases with volume and flow rate; but they are also related to the location of the discharge.

Where water is discharged to surface water or groundwater, a high standard of treatment is required, so the cost will be greater.

For water that is discharged to a foul sewer, whilst a lower treatment standard may be applied, the unit cost (per m^3) for water discharge will be greater than that for release to the environment; frequently making discharge to sewer a more expensive option.

Peak Flow Estimation (CIRIA Method)

Peak Flow: 471 m^3/hr

Site Area: 26 Ha

Annual Average Rainfall: 600 to 800mm/year

Storm Return Period: 1 10 Years

Soil Class: fine sands, silts and clays. Permeable soils with shallow groundwater in low lying areas

2.2 Fines and Criminal Sanctions

In addition to the courts ability to hand out large fines for water pollution (UK record to date £20million fine handed out to Thames Water for sewage pollution), the environmental regulator has the ability to impose a range of other penalties. For example:

Enforcement Undertaking:

As an alternative to court action, the Regulator agrees a payment with the offender to cover the cost of the damages to the environment; and provide recompense to the people or organisation which have been affected by their actions.

In the case of the Aberdeen Western Periphery Route, the financial value of the silt pollution caused was valued at £280,850.

Stop Notices:

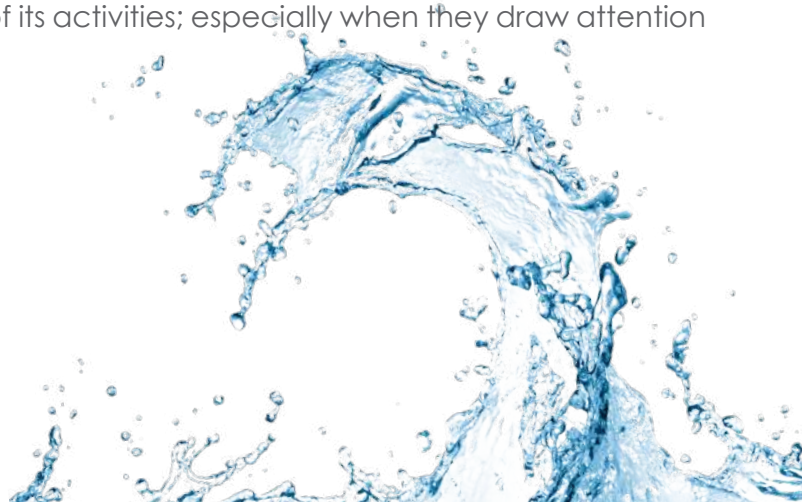
Where the Regulator is of the opinion that site activities may pose a significant risk to the environment, they may issue a Stop Notice, prohibiting works from proceeding.

As part of the Stop Notice, conditions relating to the protection of the environment may be included. The notice will remain in place until such time as the stipulated measures have been complied with.

2.3 Brand Damage

In the past 12 months, mass public protects such as the campaign for Climate change and the public outcry against plastic in our oceans has taken public awareness of the need to protect the environment to new heights.

The public have come to realise that social media campaigns, setting up site watch groups and the submission of letters of objection at the planning stage, is an effective way of ensuring that a company minimises the environmental impacts of its activities; especially when they draw attention to a company's previous performance.

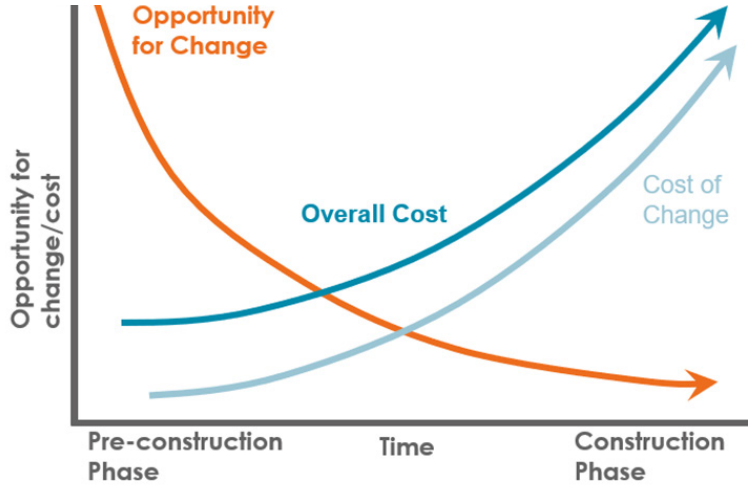


3. The Benefits of Early Engagement

Companies who pre-plan their work activities to include for the protection of the environment can reap a number of benefits; for example:

- Increased profitability - works will be completed more efficiently using the correct amount of resource, in a timely manner.
- Better client relationships - resulting in smoother operation of the project and increased order books;
- Better stakeholder relationships - raising the profile of the company, promoting the company brand;
- Speedier and more appropriate response to any pollution incident - minimising its spread and environmental impact;
- Better relationships with the Environmental Regulator - reducing the amount of regulatory scrutiny on the company's operations

Whilst most companies do have an internal environmental management team, these teams cannot totally focus on the management of surface water and groundwater. They have responsibility for a wide range of activities such as archaeology, wildlife and habitats, emissions to air and waste minimisation.



Even within large companies there is a need to access the services of an external water treatment specialist to support the in-house team. Lack of internal specialists within a company may be detrimental to the successful outcome of the project. For example:

- Where water issues are left unaddressed until commencement of the site operational phase, there may be only little opportunity to add value.
- The optimum time to influence a project is at the start, thus providing the greatest benefit.
- Consideration of water management issues needs early involvement of a water treatment specialist.
- The late stage involvement of a water treatment specialist is often not driven by cost reduction, it is more likely to be driven by legal compliance.

4. Main Pollutants

In relation to the development of Greenfield and Brownfield sites, there are four key water pollutants which need to be considered by all sites where excavation into the ground is required. These pollutants are:

- Silt laden water
- Alkaline pH
- Dissolved Metals
- Fuels and Oils

A proactive site will manage these pollutants until permanent water treatment systems (site drainage, suds systems etc) are installed and the risks of polluted water being released is eliminated.

4.1 Silt Laden Water

The release of turbid, cloudy, silt laden water into the aquatic environment, can have a large negative impact on the quality of inland water ways. Fine grained sediment may settle to the bed of the waterway, blind off gravels and destroy vital habitats.

The simple act of turning a water course cloudy may cause fish gills to become blocked, alter the natural penetration of light, increase the temperature of the water body and/or cause a reduction in oxygen levels.

4.2 Alkaline pH

The hydration of cement to make it set, causes a dramatic increase in the pH of water that comes into contact with it i.e. wash water, run-off from recently poured areas of concrete. Also, the use of hydro-demolition to cut concrete will cause an increase in the pH of the blast water.

Frequently, the pH will be in the region of pH12 to 13, a similar pH to oven cleaner.

The pH range typical of inland waters is in the region pH 6 to 9, and for discharge to foul sewers is typically pH 5 to 10.

The aquatic environment is very sensitive to pH, and even small changes can have a widespread impact on biodiversity.

Council and Contractor in Court following pollution resulting from bridge strengthening works.

A new concrete structure was needed to strengthen the bridge, the works should have been carried out in dry conditions. Water came into contact with curing concrete.

The Court heard that cement is highly alkaline and can be fatal to fish. The stream turned milky white in colour and had an elevated pH.

Dead fish were reported over a 1.5km stretch downstream of the bridge. Some 4,000 fish were killed.

4.3 Metals

Metal rich waters can occur as a result of three main sources, namely:

- Extraction of minerals and ores;
- On Brownfield land as a result of man's activity;
- Natural occurring in the soils and rocks.

Phytotoxic metals are harmful to vegetation, zootoxic metals are harmful to vertebrates and invertebrates. Metals may also bio-accumulate within the food chain.

The build up of metals within sewage sludge, means that metals discharges to foul sewers are also tightly controlled.

4.4 Fuel and Oils

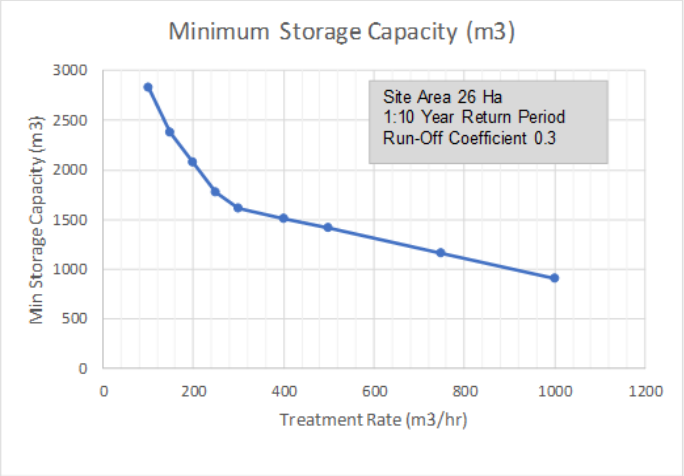
Fuels (petrol, diesel, kerosene) and oils (lubricating oil, engine oil and tars) can be present on nearly all brown field land sites. Other organic compounds e.g. chlorinated solvents and creosote may be present as a result of particular industrial activities which have been undertaken.

Organic compounds may be present as a separate liquid phase (NAPL) or may be dissolved within the water.

They principally pose a hazard to the environment as a result of either: their toxicity; their ability to coat surfaces; biodegradation consuming oxygen dissolved within the water.

5. Water Management Support Services

John F Hunt Water Tech is set up to focus on water management issues. It provides advice and support internally across the John F Hunt Group of companies and directly to construction and industrial clients.



In respect of the Construction Business Sector, Water Tech can provide support to a project throughout all phases i.e. Pre-construction, Construction and Project Completion. A summary of our support services is given below.

5.1 Pre-Construction

Pre-Construction support services define the scale of the water management issues that will be encountered by the project and the identification of cost-effective solutions to mitigate areas of concern. Any measures considered must be practical and ensure that the site will be able to remain legally compliant.

- Identifying permit and consent issues. Measures to obtain all necessary permits/consents for the discharge and/or treatment of the excess water, including required timescales.

- Preparation and submission of applications for permits and consents. Permitting issues can not be left unaddressed and need to be progressed in-advance of the site works.

- Development of a written water management plan to be used throughout the Construction Phase of the project.

- Development of cost model (Capex and Opex) for the implementation of the Water Management Plan. Allowing adequate financial provision to allow proper operation of the site throughout the construction phase, minimising the potential for the site to affect the local environment.

A successful outcome for the project may be reflected by the thoroughness of the information collected and evaluated during the pre-construction phase.

Key Points to be addressed during Pre-Construction.

- How much water (surface water and groundwater) will be generated?
- What can be done to reduce the volume of water that will need to be treated?
- How will the water be disposed?
- What permits/consents will be required and how long will they take to obtain?
- What treatment water quality standards will be applied to the discharge?
- What are the options for treating the water to the required standard?
- What size will the treatment system need to be and is sufficient space on site available?
- What are the Capex and Opex costs associated with the treatment and/or management of the water treatment system?

5.2 Construction

For projects where during the pre-construction phase there has been an appropriate level of planning and assessment of water management issues - The focus of the construction phase can move to implementation, operation and maintenance of the systems which have to be put in place.

Where a inadequate levels of pre-construction planning have been completed - The site team often have to start the assessment of the water related issues from scratch; frequently with little budgetary provision being available and/or insufficient time. This increases project risks through cost, overruns and delays.

The support services provided by the Water Tech Group enable the Clients site team to remain focussed on the delivery of the project itself, rather than assign their limited in-house resource to the management of water related issues.

5.3 Project Completion

During the Project Completion phase, John F Hunt Water Tech, though their involvement in the preceding phases, will be able to add value through the preparation of close out reports, on the operation of the water management system to include:

- Statistics on environmental performance
- Recycling and/or re-use of water
- An assessment of any lessons learned
- Areas which could in the future be improved

Construction Phase Support Services

Provision of specialist subcontractors and/or equipment suppliers:

- Water Treatment Equipment
- Temporary Power Supply
- Feed water pump and pipe-work
- Chemical Consumables

On-site training of personal in pollution prevention and operation of installed water management systems.

Where required, provision of man power to operate and maintain installed abatement systems.

Collection of environmental samples to demonstrate compliance with permit/consent conditions.

Preparation and submission of site inspections and monitoring reports in a format suitable for issue to regulatory bodies e.g. Environmental Agency and Environmental Health Department.

Disposal of waste arisings e.g. unused surplus treatment chemicals, sludge etc.