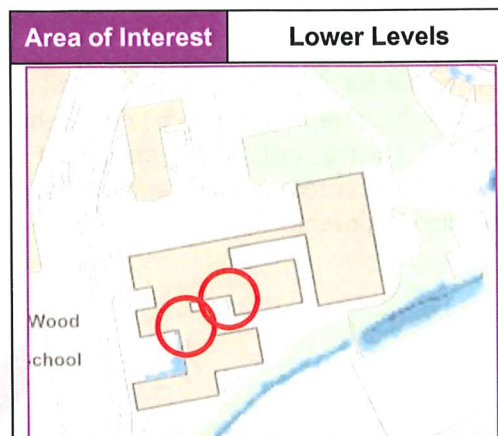


FL 2018.4 Temporary Flood Protection Measures

Priority	Complexity	Cost Benefit
Medium	Minor Implementation	3
■■■■□□	■■■■□□	■■■■■

Description:

During the survey, it was mentioned that no temporary flood protection measures, such as barriers and sandbags, are available at the school. This equipment would support Parrs Wood in protecting its assets in case of a flooding event / heavy rains – in particular, the entrance of the boiler rooms at the music block and the entrance of the electrical rooms at the main school building.

**Proposed Recommendation:**

We recommend Parrs Wood High School to consider purchasing and storing temporary flood protection measures such as barriers and sandbags. For instance, temporary flood protection (e.g. door guards) at the door openings of the main entrance could be deployed in the event of a windstorm / flood / surge warning.

For further information, please refer to:

- Environment Agency – Practical Guidance for Property Level Flood Protection, "5 Flood Resistance products"

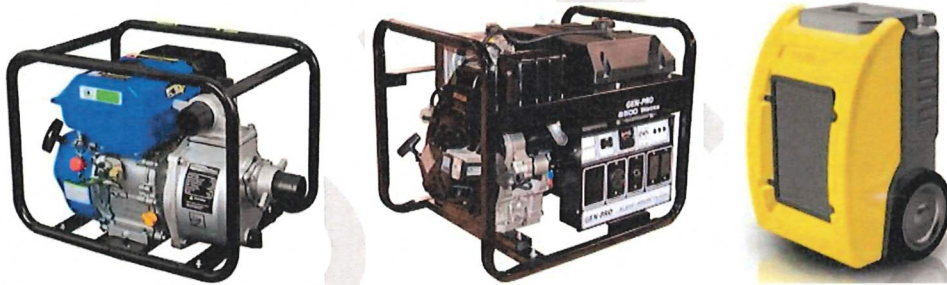
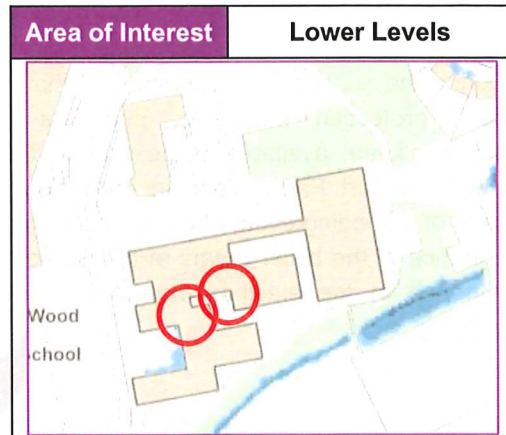
Estimated Cost for Implementation: Minor Implementation required: [2,500 GBP ~ 5,000 GBP].

FL 2018.5 Mobile Flood Protection Equipment

Priority	Complexity	Cost Benefit
Low	Minor Implementation	2
■□□□□	■□□□□	■□□□□

Description:

During the survey, it was mentioned that no mobile flood pumps / power generators nor dehumidifiers are available at the facility. This equipment would support Parrs Wood in reducing the length of downtime in case of a flooding event.

**Proposed Recommendation:**

We recommend that Parrs Wood considers purchasing mobile flood pumps / portable dehumidifiers to remove flood waters post-event in order to reduce the length of downtime. Mobile generators can be used to operate these. Ensure that any portable back-up and mobile equipment such as pumps, generators and dehumidifiers are protected, accessible and fully fuelled.

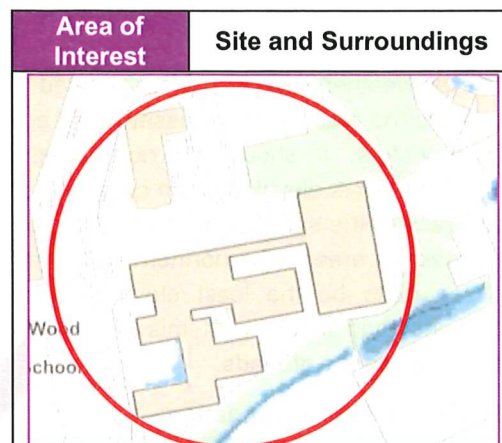
Estimated Cost for Implementation: Minor Implementation required: [1,500 GBP ~ 3,000 GBP].

FL 2018.6 Water Drainage System

Priority	Complexity	Cost Benefit
Low	HE PR	2
■□□□□	■□□□□	■□□□□

Description:

Water drainage and collection appears to be well maintained with no visible blockages. A formal procedure to keep the drainage system status monitored and unblocked appears not to be in place.

**Proposed Recommendation:**

We recommend that Parrs Wood considers including a self-inspection walk around of the drainage system in the routine maintenance procedure. This would allow an early identification of key hazardous conditions and the site management to address any potential issue in a timely manner.

Check for the possibilities of water coming back up into the buildings from sewer or drainage lines. Use anti-siphon valves in locations where the use of a pressure vacuum breaker (PVB) or a double-check valve is needed to protect against backflow.

Estimated Cost for Implementation: No significant investments (mainly human element).

FL 2018.7 Astro football pitch flood protection

Priority	Complexity	Cost Benefit
Low	Major Implementation	1
■□□□	■■■■■	■□□□

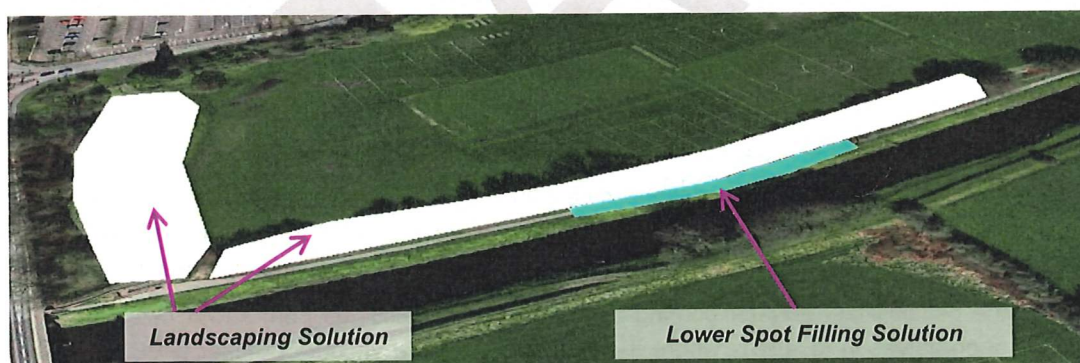
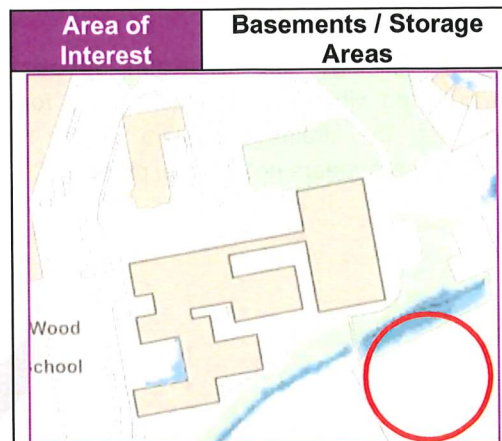
Description:

The all-weather football pitch is located in a floodplain and it is the most exposed asset to the action of riverine flood waters. It should be noted that the southern embankment is elevated when compared to the northern one (where the sports grounds are located). In addition, the eastern area of the northern embankment has been observed to be the least elevated (with lower spots sections) and in the past this caused flood waters to reach the sports grounds.

Proposed Recommendation:

In case Parrs Wood would like to protect the all-weather football pitch from the direct action of flood waters, the following mitigation actions could be considered and should be discussed with the environment agency for review and approval:

- Landscaping to convey flood waters, swales, soakaways, detention ponds and wetlands.
- or
- Filling the lower spots of the embankment.



For further information regarding information, cost estimates and case studies for the above mitigation measures, please refer to: [Susdrain website](https://www.susdrain.org/delivering-suds/retrofitting/why-retrofit/why-change.html) (Includes information on retrofitting SuDS and case studies for schools). <https://www.susdrain.org/delivering-suds/retrofitting/why-retrofit/why-change.html> / Environment Agency – Practical Guidance for Property Level Flood Protection, / Flood And Coastal Erosion Risk Management Research And Development Programme – Cost estimation for fluvial defences – Summary of evidence / Flood and Coastal Erosion Risk Management Research and Development Programme – Cost Estimation for SUDS – Summary of evidence

Estimated Cost for Implementation: Major Implementation required: [~ £150,000], considering:

- Rising / building embankment along lower bank: ~ £1,500/m x 100m = £ 150,000 (no residual risk)
- SuDS – £80,000 per 5,000m³ pond (300*3*5m):– 2 ponds x 5,000m³ – £ 160,000 (no residual risk)

It should also be noted that in addition other parameters such as future maintenance are normally required to ensure whole life costs are correctly defined so as to incorporate these into an appraisal. The design life and discount rates are used to convert future costs over a scheme life to 'present values' so that they can be compared to the benefits.

FL 2018.8 Emergency Diesel Generator Agreement

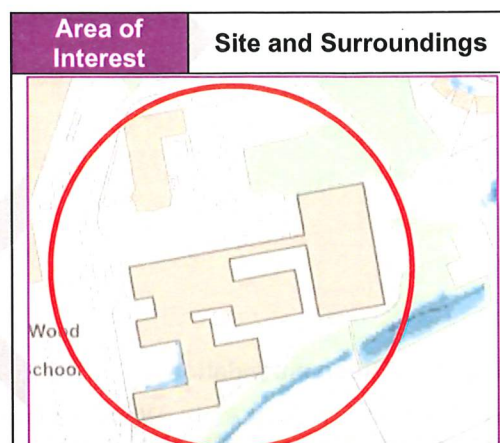
Priority	Complexity	Cost Benefit
Medium	Minor Implementation	2
■■■■□□	■■■■□□	■■■■□□

Description:

A medium to low level of flooding risk exists at the school and flash flood waters could impact the Main Building Electrical Rooms: transformer rooms and PV system inverter room.

With the main power transformer unavailable the entire school would be not provided with electrical energy and would be closed until the electrical items can be replaced (Estimated lead time: 3 months).

An Emergency Diesel Generator could sustain the school's electricity and power needs; this could be provided by the school's own Service Level provider, Energy Management Unit, Manchester City Council (MCC).



Proposed Recommendation:

We recommend that Parrs Wood engages its Service Level provider – Energy Management Unit – Manchester City Council, in order to discuss in advance the availability of an Emergency Diesel Generator dedicated to the school in case of key transformers unavailability. It should be noted that this could be a good risk mitigation practice not only in terms of flood risk but also for business interruption arising from other type of hazards (i.e. fire, electrical failure / machinery breakdown). As an alternative, a membership with a specialized restoration company could be considered as a good value for money risk mitigation solution.

Estimated Cost for Implementation: costs can vary depending on the type of contract in place (i.e. – general emergency supply agreement vs stand-alone urgency solution).

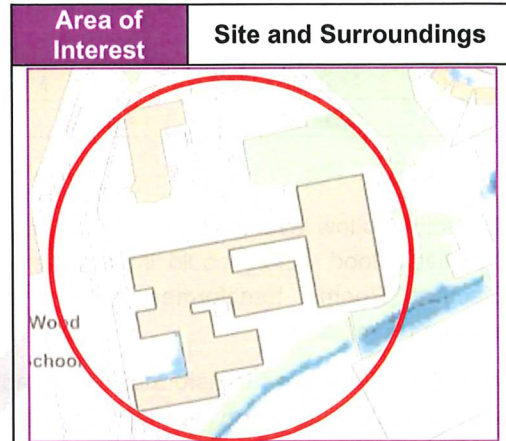
In this case, it should be noted that the coverage provided by the RPA would compensate the school for an increase in cost of working resulting from interruption or interference with the business following a material damage loss up to 10,000,000 GBP any one business interruption loss.

FL 2018.9 Flood Emergency Response Plan

Priority	Complexity	Cost Benefit
High	HE / PR	3
■■■■■	■□□□	■■■■■

Description:

The site is exposed to riverine and surface water flood risk, and the current Emergency Response Plan is not directly addressing this type of event.

**Proposed Recommendation:**

We recommend that Parrs Wood considers the section **Good Practice Advice on Business Continuity and Emergency Response Guidelines** of this report to integrate the current Emergency Response Plan to cover this kind of peril.

In addition, it is suggested that due to the level of hazard present at the site and potential hazards to the emergency response team, initial training focussed on flood risk management (plus annual refresher training in future) should be provided to the school Emergency Response Team.

Estimated Cost for Implementation: No significant investments (mainly human element).

Cost/Benefit Analysis

The suggested risk mitigation measures have different impacts on the PMLs and Parrs Wood School may want to prioritize the implementation of these based on their Cost/Benefit Ratio.

Although 4 recommendations have no direct impact on the Loss Scenario presented in this report, these are considered to be potentially beneficial to the academy: **FL2018.01 – Housekeeping**, **FL2018.03 – Increase the Boilers Elevation**, **FL2018.06 – Water Drainage System** and **FL2018.09 – Flood Emergency Response Plan**.

The recommendations which impact the most on the PML are summarized below:

RECOMMENDATION NAME	PML UNMITIGATED		INDICATIVE MITIGATION COST (*)	PML MITIGATED		BENEFIT	
	Property Damage [GBP]	Downtime [Weeks]		Property Damage [GBP]	Downtime [Weeks]	Property Damage [GBP]	Downtime [Weeks]
Increase the Electrical Equipment Elevation (FL2018.02)	150,000 GBP	12	≥2,500 - 5,000 GBP	5,000 GBP	-	140,000 GBP	12
Temporary Flood Protection Measures (FL2018.04) (**)	150,000 GBP	12	≥2,500 - 5,000 GBP	500 GBP	-	144,500 GBP	12
Emergency Diesel Generator Agreement (FL2018.08)	150,000 GBP	12	≥ 500 GBP (***)	150,000 GBP	1	-	11
Astro football pitch flood protection (FL2018.07)	40,000 GBP	(****) 12	150,000 - 160,000 GBP	-	-	- 10,000 GBP	(****) 12

Notes:

(*) Best estimate based on engineering experience – this could be further refined following quotation requests from contractors and suppliers.

(**) Assuming the flood defences are installed properly and on time once flood alert / adverse -weather bulletin is received.

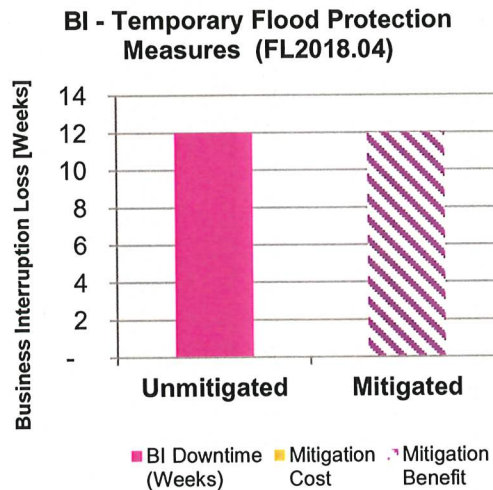
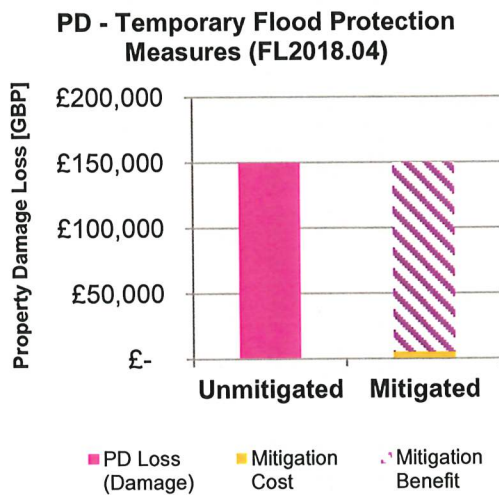
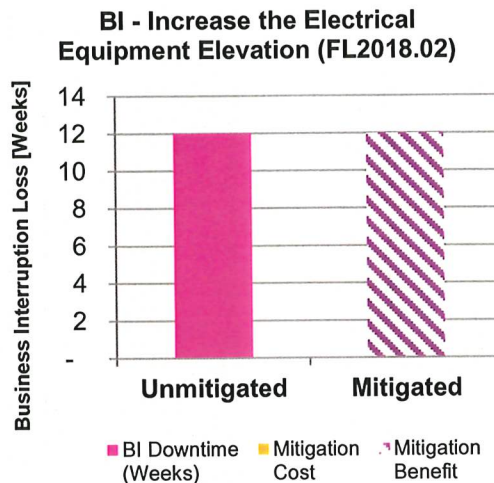
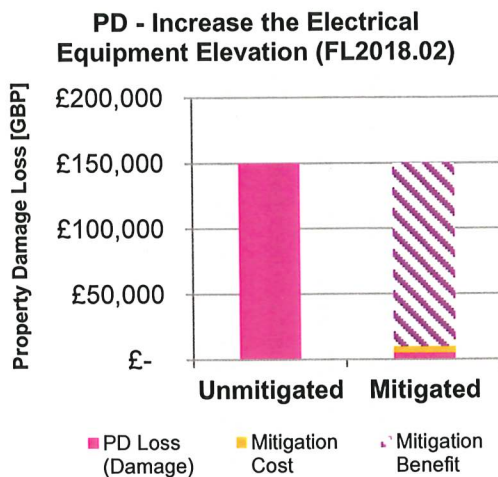
(***) £ 500 is the deductible for the Business Interruption (extra expenses) coverage. Additional costs are transferred to the RPA.

(****) 12 weeks downtime is referred to the sports grounds only. In this case, Parrs Wood's operations would not be affected.

An in-depth cost / benefit review for each recommendation is reported in the next pages.

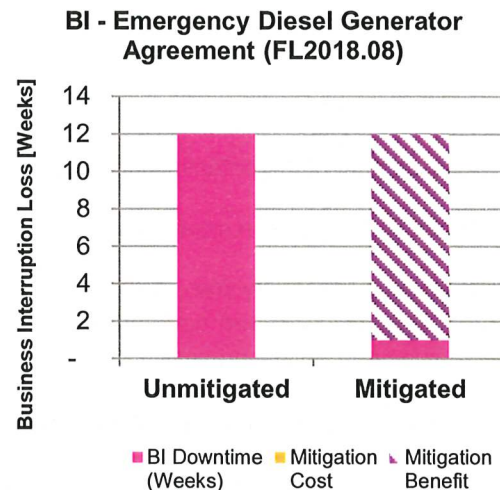
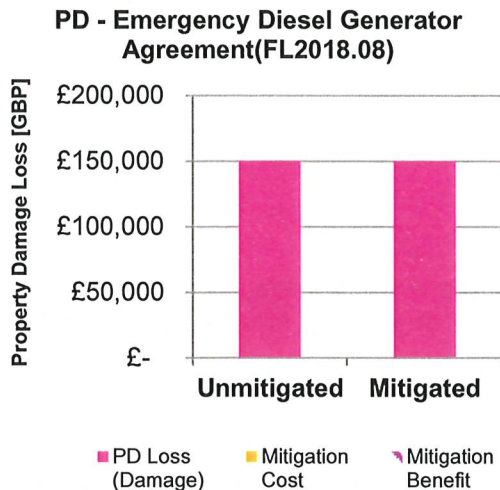
Surface Water Loss Scenario Recommendations (unmitigated PML: PD £ 150,000, BI 3 months)

- 2018.02 Increase the Electrical Equipment Elevation and 2018.04 Temporary Flood Protection Measures are low-cost mitigation measures which would reduce to marginal the likelihood of having the key electrical equipment affected by water in case of a surface flooding scenario. In this case, the **cost/benefit ratio** of the suggested recommendations is **favourable**.



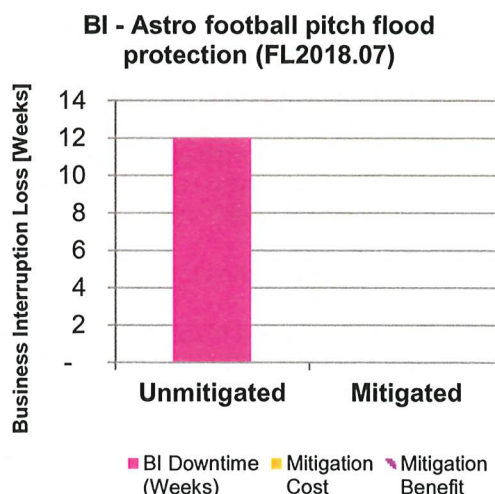
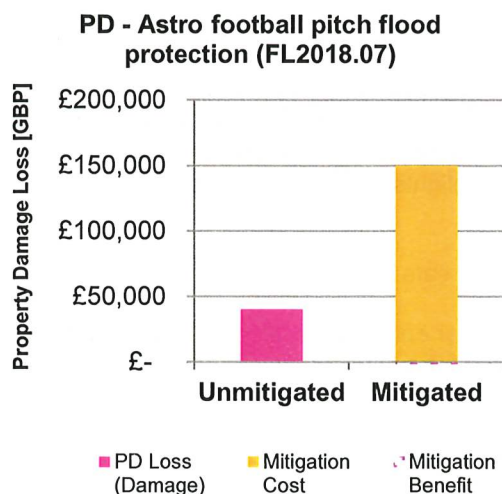
- **2018.08 Emergency Diesel Generator Agreement** is a low-cost mitigation measure which would reduce the downtime to a marginal level following an eventual major electrical breakdown at the school. In this case, the **cost/benefit ratio** of the suggested recommendations is **favourable**.

Note: the mitigation cost, in this case, is assumed to be £ 500, which is the deductible for the Business Interruption (extra expenses) coverage. Additional costs are transferred to the RPA and are not impacting on Parrs Wood P&L.



Riverine Flood Loss Scenario Recommendations (unmitigated PML: PD £ 40,000, BI 3 months)

- **2018.07 Astro Football Pitch Flood Protection** is a cost-intensive mitigation measure. In particular, it should be noted that this kind of recommendation could be of difficult implementation given that the Environment Agency has marked the Sports Grounds area of the school as "Flood Plain". In this case, the **cost/benefit ratio** of the suggested recommendations is **unfavourable when compared with a single occurrence of a riverine flood event**.



Good Practice Advice on Business Continuity and Emergency Response Guidelines

During the Survey the school's team reported that the current emergency response plan is not directly addressing flood risk. In order to improve the flood resilience at site level, a number of useful actions to be considered before, during and after a flood event are summarized in the following pages.

Before the Event

The content of this report covers 2 key areas of the preparation phase:

- Assessment of the potential flood risk
- Flood Risk Mitigation measures

A written emergency / recovery plan is essential to mitigating business interruption losses. The plan should be regularly reviewed and updated and should cover some of the following key elements as part of the planning and review process:

- Ensure that your contact list of key stakeholders is up-to-date.
- Develop emergency pre-planning agreements with existing contractors for supplies and repairs that may be needed after a flood.
- Consider establishing agreements with contractors who are from outside the region and who are not likely to be affected by a local catastrophic event.
- Ensure sufficient equipment is available for clean-up/repair after a flood, such as personal protective equipment, torches, mops, buckets, hoses, shovels, rakes, ladders, pumping equipment, forklifts, air-blowers (for drying) and emergency first aid kits.

Impending and during the event

IMPLEMENT YOUR EMERGENCY RESPONSE PLAN

- Take specific actions based on the predetermined checkpoints outlined in your plan.
- Ensure that the Emergency Response Team (ERT) members who volunteered to stay on site have proper supplies and equipment (such as personal protective equipment - PPE, torches, tools, portable pumping equipment and hoses, extinguishers, emergency first aid kits, drinkable water, non-perishable food, flashlights, air-blowers -for drying- and two-way radios/mobile telephones).
- ERT personnel should only stay at the facility if safe to do so.
- Fill sandbags and place around likely flood water entry points, also place around business critical equipment that cannot be elevated and fire protection equipment such as the fire pump house.
- Deploy or operate any installed floodgates or barriers.
- Remove all loose debris.
- Secure or anchor equipment that cannot be elevated or moved to another location.

- Consider covering, protecting, shrouding and/or spraying large critical equipment with plastic sheets, tarpaulins, greasing agents and water displacing rust preventing compounds.
- Ensure that sump pumps are operational.
- Prevent backflow through floor drains and other piping by closing manually operated valves.
- Check that all roof, floor, and yard drainage systems are clear and flowing.
- Ensure that vehicles are placed in a position above water level.
- Ensure that any portable back-up generators are protected, accessible and fully fuelled.
- Ensure all cool rooms or refrigerated storage areas etc. are adequately sealed and secured.
- Relocate highly valuable, vulnerable or perishable stock to a suitable offsite location or to standard or refrigerated shipping containers which are located above the maximum expected flood level.
- Ensure that any IT equipment is placed in a suitable storage area. Backup all computer files if possible and take or electronically transfer all backups to a safe, alternative location.
- Secure all critical records and documents, if possible.

REDUCE THE CHANCE OF FIRE FOLLOWING FLOOD

A flooding event may lead to leakage of flammable materials and create sources of ignition due to short-circuited electrics. To mitigate the risk of subsequent fire from a flood:

- Shut off electricity to reduce the risk of potential short circuiting of electrical equipment.
- Shut off gas supplies to mitigate against release of flammable contents following rupturing of piping.
- Ensure that a diesel driven pump is available as a backup if the site's fire pump is driven off an electrical pump.
- Ensure that portable backup generators are fully fuelled.
- Protect your fire protection systems by installing barriers around sprinkler risers, valves and hydrants.

After the event

SECURE THE SITE

- Whilst it is important to secure the site, before you enter the area, make sure it is safe to do so.
- Complete a site risk assessment to ascertain whether the site is safe to access or not. Any doubts over structural integrity or contamination by chemicals or other contaminants needs careful pre-assessment to confirm that flooded buildings are confirmed as being structurally stable and safe.

- Empower ERT members to maintain as much fire protection in service as possible if sprinkler piping is damaged.
- Repair damaged fire protection systems immediately. If systems are impaired, follow the organisation's fire impairment procedures.
- If the sprinkler or hydrant systems have been affected by the flood ensure a thorough review is completed before the systems are operated or returned to service. In particular, the systems should be checked for possible contamination with mud, silt and other debris if the water supply source originates from a dam, river, lake or other source which has been affected by flooding. The sprinkler and hydrant systems should be cleaned and flushed as necessary
- Inspect process system and gas, water, and electrical services for damage and possible leaks. Shut off as necessary.
- Check all electronic and other security systems and repair or return them to service if feasible. Engage a security guard service if it is not possible to fully secure the site.

MITIGATE BUSINESS INTERRUPTION

- Activate your business continuity/recovery plan as necessary.
- Initiate clean-up and any necessary repairs as soon as it is safe to do so (see below).
- Consider utilising the services of specialist emergency cleaning contractors.
- Contact parents and key customers ASAP to advise them of the circumstances and the impact on your ability to deliver goods or receive raw materials and other supplies.
- Work closely with all parents and customers to minimise the impact on yours and their businesses

CLEAN UP AND REPAIR THE SITE

- Building materials may contain hazardous substances such as asbestos that, when airborne and inhaled, can be detrimental to long-term health. Any material that could contain asbestos should not be disturbed. All hazardous materials should be removed by qualified professionals using proper personal protective equipment and disposal methods.
- Dehumidify areas containing critical equipment. Ensure that all business critical equipment items and electrical distribution equipment is checked, cleaned, dried and tested.
- Remove flood debris.
- Dry wet insulation and building materials.
- Clean up spilled flammable liquids and contaminants.
- Do not attempt to use electrical or gas fired equipment unless it has been cleaned, repaired and inspected by a qualified tradesperson.
- If it is safe to do so, essential services like plumbing, water systems, gas and electrical services can be repaired – but use only qualified tradespeople and keep parts that are replaced, as well as copies of each bill.

- Prohibit hot work until fire protection is restored. For any repairs that require hot work, use and follow the instructions outlined in your company's Hot Work Permit System.
- Secure critical records and documents if such steps weren't taken previously.
- Take steps to mitigate or minimise your losses, for example do not throw out items that may be easily cleaned or repaired.
- To avoid injury and infection, make sure you use proper personal protective (safety) gear such as gloves, sturdy footwear and always wash thoroughly afterwards.
- Practicing good basic hygiene during the emergency period is crucial. Always wash with soap and use water that has been boiled or disinfected, or use hand sanitising products.
- Ruined food and other perishables can be disposed of, but keep a list of these items.
- In all cases, remember that safety is the top priority, both for you and for others assisting you.

PREPARE FOR A CLAIM

- Take photos (or video footage) before moving anything or cleaning up.
- For unsalvageable items, take specific photographs to show the condition of the item.
- Record brand names and model types.
- Keep a careful, accurate record of all costs incurred during the clean-up phase. This may include things such as trade services, hire of equipment, vehicle usage over and above the norm, labour hours of employees (specifically noting overtime), etc.
- Maintain notes of all related phone calls and discussions.
- Locate all related information if possible, such as previous budgets, plans, asset registers, etc.
- Nominate one person to be the coordinator for all claim related activities.

Appendix Section

Limitations

The recommendations provided in this report are based on readily available information, the site inspection and discussions with site personnel. No structural analysis or performance calculations have been undertaken as part of this study. The results presented in this report are mainly related to mitigate and prevent damages to the main buildings, equipment, contents and business interruption where possible, as a result of direct flood impact only. They do not include any secondary peril associated with losses that may arise due to damage to affected entities outside the boundaries of the site such as lifelines, other infrastructure or any third party entities.

The findings from this assessment are for the sole use of The Department for Education and the Parrs Wood High School in the flood risk evaluation of this location. It is not intended that they are for to be used by other parties and may not contain sufficient information for purposes of other parties or other uses. Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable consultants practicing in this field at this time. No other warranty, express or implied, is made as to the professional advice included in this report.

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