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| Committee(s) | Dated: |
| Epping Forest and Commons | 14 01 19 |
| Subject: Epping Forest Fires 2018 Update (SEF 5/19) | Public |
| Report of: Colin Buttery, Director of Open Spaces | For Information |
| Report author: Martin Newnham - Head Forest Keeper, Epping Forest | |

Summary

During the drought of June/July 2013, Epping Forest experienced a series of wildfires, principally across the south of the Forest, at Leyton, Manor and Wanstead Flats. In Autumn 2013, London Fire Brigade, London Borough of Waltham Forest and City Corporation Officers convened a Formal Review Meeting (FRM) regarding the management of wildfires in Epping Forest focusing on learning and improvement points from the existing Epping Forest Fire Habitat Plan. In particular, there was a specific review of a major incident which occurred at Leyton Flats on 19 July 2013 where 135 fire fighters and 16 tenders fought three fires for over 6 hours. A 14-point Wildfire Improvement Plan (WIP) under 4 key headings was agreed to improve the fire incident responsiveness of all Fire Brigade and Epping Forest staff.

This report details progress with the implementation of the 2013 WIP, with reference to the more recent 2018 drought which saw 47 wildfires at various locations across Epping Forest, including a major 4-day incident at Wanstead Flats, described as London's largest ever grassland fire. The progressive implementation of the WIP undoubtedly improved the ability of Epping Forest staff to support the Essex and London Fire Brigades at incidents in 2018. The report also details 6 further learning improvement areas for the division which are being shared throughout the Open Spaces Department and more widely with major London Open Spaces.

Recommendation(s)

Members are asked to:

- Note the report.

Main Report

Background – Summer 2013 Drought

1. Following a series of wild fires during the drought of June/July 2013, principally across the south of the Forest at Leyton, Manor and Wanstead Flats, London Fire Brigade, London Borough of Waltham Forest and City Corporation Officers convened a Formal Review Meeting (FRM) regarding the management of wild

fires in Epping Forest focusing on learning and improvement points from the existing Fire Habitat Plan. In particular, there was a specific review of a major incident which occurred at Leyton Flats on 19 July 2013 where 135 fire fighters and 16 tenders fought three fires for over 6 hours. A 14-point Wildfire Improvement Plan (WIP) (Appendix 1) under 4 key themes was agreed to improve the fire incident responsiveness of all Epping Forest staff.

Current Position – 2018 Summer Drought

2. The Met Office considers the summer of 2018 to be tied with 1976, 2003 and 2006 as the hottest summer on record for the United Kingdom as a whole, with average temperatures of 15.8 °C (60.4 °F). In England, average temperatures for the summer were the highest on record at 17.2 °C (63.0 °F), narrowly ahead of the 17.0 °C (62.6 °F) average in 1976. The high temperatures combined with below average rainfall during May, June and July left much of Epping Forest's grass and heathland in a tinder dry condition.
3. Global warming is a key aspect of climate change. The World Meteorological Office reports that the past four years have been the hottest on record, and the 20 warmest have occurred in the past 22 years. The warming trend is unmistakeable and drought planning research suggests that both drought intensity and the spatial extent of droughts in the UK are projected by climate models to increase into the future.
4. Between 15 July and 13 October 2018, a total of 47 wildfires were recorded across Epping Forest. Given the nature of wildfires it is difficult to assess the cause of each individual fire. At some fire locations the large number of cigarette stubs suggests that carelessly discarded cigarettes may have played a role in the development of some fires. Elsewhere disposable barbeques and cooking fires have undoubtedly initiated wildfires, as has some clearly deliberate attempts to start fires. Data collected by the Urban Heaths Partnership (UHP) shows that the majority of heathland wildfires are maliciously started.
5. The City Corporation enjoyed incredible and highly professional support from the Emergency Services, across most of the 47 fires reported. In particular, the London Fire Brigade played a leading role with regard to a 4-day major incident running from Sunday 15 to Wednesday 18 July at Wanstead Flats where 220 firefighters and 40 fire tenders brought under control a fire which has been described as London's largest grassland wildfire.

Current Position

6. This report considers progress with the implementation of the 2013 Epping Forest WIP by reference to the impacts on the effectiveness of the 2018 wildfire response and also notes 6 new learning improvement points which will be considered over the coming months.

Wildlife Improvement Plan 2013

Theme A - Staff training and Awareness

Fire Severity Index Awareness

7. All staff were kept aware by weekly email of the frequent high to very high Fire Severity Index (FSI) scores developed by the Met Office. The significance of the FSI scores were underlined by the use of the Epping Forest Severe Weather Protocol which was designed to support staff working outdoors in heatwave weather with increased sun protection; hydration and provided for additional rest breaks.

Incident Management & Access to Incident Command Centres

8. The Local Authority Liaison Officer (LALO) Training undertaken by 11 key Epping Forest staff during 2016 and 2017, together with a major 2-day Emergency Plan scenario training at Epping Forest in 2016, provided staff with the key skills to operate within the Multi-Agency Gold Incident Command (MAGIC) Control Room environment. Contrary to the previous 2013 major incident, Epping Forest staff were granted full access to the control room and the regular 3-hourly update briefings. Incident Command Meetings led by the Fire Brigade, also involved the Police Service; Transport for London; the 'turn cock' Thames Water representative and Epping Forest staff.
9. Key learning points from the major incident included recognition that the limited range of Epping Forest emergency response duty staff could not rotate at the same 8-hour shift frequency as the emergency services for longer incidents. There were also initial problems on Incident Day 1 (Sunday) regarding access to the necessary skills to map the spread of the fire on City Maps or ArcGIS, together with access to Twitter and the City Corporation website. Epping Forest has identified additional training requirements related to this experience and the need for Gold Command to 'queue' in advance replacement emergency response staff to relieve first responders.

Theme B - Incident Management

Mapping & Numbering/Naming Fire Gates

10. The map-based numbering nomenclature for the 19 fire gates in the zone and the 182 fire gates across the Forest (see Appendix 3) proved useful in helping the emergency services in directing teams through various access points. The physical numbering of gates recommended in 2013 would have been beneficial and temporary numbering for the summer of 2019 will be in place ahead of a more formal scheme which can only be implemented when finances allow.

Map and physically mark (Emergency Vehicle Rendezvous Points - EVRPs)

11. While this work was completed the Fire Brigade responded directly to first-hand reports of the fire and therefore EVRPs were of no value in this particular emergency scenario.

Map positions of all fire hydrants and keep hydrant accesses clear

12. Hydrant provision around Wanstead Flats was limited. LFB Gold Command made an early decision to install a surface mounted ring main structure around Wanstead Flats on the public highway. The ring main also supplied Alexandra Lake which was used as a recharging point for peripatetic appliances that were not linked directly to the ring main.

13. The experience of this incident has encouraged Epping Forest staff to consider the designation of fire ponds at all key grassland and heathland sites which can be filled from hydrant supplementary piping and can ensure tenders have the ability to recharge their water tanks during major incidents.

Joint training exercises with Essex and London Fire Brigades each Spring.

14. Epping Forest staff had trained with the Essex Fire and Rescue Service in May 2018. Training with the London Fire Brigade as per the FRM recommendation had not been possible. Given the impact of the major incident in July joint training commenced in December 2018 and further joint training will take place as an operational priority in Spring 2019.

Enhance Fire Brigade off-road and non-hydrant capability

15. Some 4 number of 1,000 litre Intermediate Bulk Containers (IBCs) were purchased following the 2013 event with the intention of providing static supply facilities. Joint training with the Fire Brigade indicated that an IBC facility mounted on Epping Forest vehicles was more effective. Vehicle-mounted IBCs were widely used throughout the drought period both to resupply fire brigade appliances working away from hydrants and by Forest Keepers to damp down former fire sites.

16. The Fire Brigade pumps loaned to Epping Forest to support IBCs were highly efficient but did not provide water for any substantial period. A 1,000 litre IBC could be emptied within 6 minutes. The simple hose-based recharge facility at The Warren estate yard also provided a lengthy delay to refilling the IBCs. Discussions are underway with Thames Water to look at options for either pumped supplies or releasing hydrants for more rapid refilling of the IBC facilities.

17. A single fire-fogging machine was purchased to help address post-fire damping down. The fire-fogger atomises bowsered water dispersing the liquid as a fine blanket of mist which was more effective in dowsing fires and provided a much longer operational period of 22 minutes/1,000l IBC. Epping Forest will consider purchasing a second fire fogging unit as funds allow.

Access to keys for fire gates

18. 23 additional keys have been provided to London Fire Brigade for all stations and tenders within the Boroughs Redbridge, Newham and Waltham Forest. These also include security fob access to the Aldersbrook Road operational yard for additional access onto Wanstead Flats.

Theme C - Habitat Management

Maintaining wider fire breaks

19. The strength of the burn fanned by light winds and the fire's own internal convection saw the fire 'leaping' 8.8 metre Centre Road and Lakeside Roads. The 6 and 8 metre cut firebreaks that were present did not arrest the spread of the fire. Ironically, it was the presence of short-mown football pitches and highway verges that arrested the eastern and southern progress of the fire.
20. Research by UHP indicates that the incidence of firebreaks stopping fires on their own is rare and they should be viewed instead as helping with overall firefighting measures. Weather is often the deciding factor as to the effectiveness of 'fire breaks', with flames and sparks more than capable of jumping the widest gap, including 6 motorway lanes in strong winds. The risk of side and back burn also increases with erratic weather.
21. The Epping Forest Conservation Team are reviewing the management objectives of heathland with a high fire loading within the Site of Special Scientific Interest (SSSI) with a view to 'de-fuelling' the heathland succession removing some of the more combustible scrub elements from the heathland, such as high gorse, which should reduce the intensity of any future burns.
22. According to research by the UHP, Natural England recommends that 'the most reliable firebreaks are strips of bare ground from which all vegetation has been removed, either mechanically (e.g. rotavated) or by back burning (if appropriate for the site). Semi-permanent breaks can be created through periodic mowing of vegetation to within a few centimetres (2.5cms) of the ground. During drought conditions Epping Forest should consider reinforcing cut firebreaks with continuous rotavated strips which would require Natural England consent. This requirement will have implications for the Epping Forest fleet with the need to substitute heavy duty flail mower collectors with 'batwing' rotary mowers.

Removal of fire 'ladders'

23. Apart from the avenue planting of roadside London Plane there were no significant veteran trees within the main burn site. Younger stands of birch and aspen were directly affected and will be removed as part of the 'de-fuelling' approach discussed earlier.

Extinguishing Sub-soil Fires

24. The same sub-soil fire phenomenon experienced at Leyton Flats in 2013 was again present at Wanstead Flats. Fires continued to burn underground in the gravel subsoil. The phenomenon was clearly identified on thermal imaging cameras from frequent helicopter overflights. Further work is required to understand the dynamics of these burns which could reflect the presence of large quantities of stored carbon; significant air pockets in the gravel pore spaces or mixed gravel deposits that may be rich in 'ancient' carbon.
25. The 'baked' or hardpan character of the surface soil layers also prevented effective fire extinguishment as little hose-borne water was able to infiltrate the soil and was simply deflected away from the fire site. The fire was only contained

on Day 3 (Tuesday) with the help of Epping Forest Contractors who deployed a sub-soiler and power harrow to break the surface soil pan to create an effective firebreak and allow the effective wetting of the soil and subsoil profile effectively limiting the spread of the fire.

26. The experience of a long burning fire at Loughton Camp indicated that the Operation teams also need to review the site protocol for chipping, as an initially extinguished fire continued to burn in wood chippings which has been spread rather than removed from the difficult to access site.

Theme D - Improved Communications

Introduce safety signing during periods of high to very-high fire severity

27. Forest Keepers have experimented with the introduction of temporary signing during hot weather warning about the dangers of using disposable barbeques in relation to wild fires. The use of the temporary signs did not result in any reduction in the number of barbeques detected and extinguished.
28. Wilde's Risk Homeostasis Theory suggests that people evaluate their own levels of personal risk and will take decisions based on the perceived risks and benefits. This rational approach to risk assessment may evaluate the information provided by signing but will not necessarily result in the behavioural changes that the signage seeks. This is particularly the case, where given the size of Epping Forest and the Keeper numbers available, the low likelihood of enforcement action will form part of that risk evaluation.

Use of indirect messaging to accentuate fire risk

29. The 'indirect messaging' suggested by the WIP focused on the provision of fire beaters at car parks and access points to accentuate concerns around jeopardy for the immediate areas.
30. The UHP have recommended the removal of fire beaters from heathland sites, due in part to health and safety concerns and together with practical experiences of their misuse. Beaters may certainly help put out small fires and are useful to those trained in their use for dealing with a situation while they wait for the emergency service. However, they could also tempt members of the public to endanger themselves through the 'heroic' fighting of fires and often, without the right training, the user can actually make things worse by 'fanning' the fire. In some instances, fire beaters have even been used to set fires.
31. An alternative that has happened with many of the local authority managed sites in Dorset is for local residents and volunteers to be provided with fire beaters. These members of the community are trained in their use and advised in what instances they should use them and more importantly when not to use them.

Use of social media to promulgate fires safety message

32. Social media particularly Twitter™ continues to be used through all severe weather events to promote public safety messages. These messages enjoy a high-level of retweeting.

33. In 2017 an arson attack on one of Epping Forest's much-loved veteran oak trees at Warren Pond resulted in record numbers of social media engagement. Epping Forest were quick to report on this within the local community, and this, coupled with quality photographs obtained at the scene, meant that local social media responded very well to the posts on Twitter and Facebook. Two Facebook posts (informing about the incident and an update the following day notifying of the positive outcome that the tree had survived the attack) had a reach of 48,321 people and the two tweets achieved 16,313 impressions – therefore total social media reach achieved was 64,634. Again, this demonstrates the power of social media to engage with extremely large numbers of our visitors quickly.

Additional Learning Points

Communication with key stakeholders

34. Given the initial challenge of responding to the major Incident fire, the early response by the Duty Team and Superintendent to Committee Members and the public was not as effective as it might have been. From Day 2 onwards it was possible to provide more regular updates and this process was expanded to include Members of Parliament and Local Councillors, a number of whom shared the updates verbatim with their constituents through social media.
35. Further consideration is being given to the development of dedicated email groups for geographic sections of Forest; expanding the current 0.6 FTE Communications Officer post and better recognition of the work of the daily Twitter Team who already manage Social Media in addition to their main work roles.

Property Information Box™ (PIBs)

36. A key flaw in the 'grab-bag' first responder scenario, established in the 2013 WIP, was the expectation that first responders would be contacted at home or at the main office where the 'grab-bags' are based. In this instance, both the responders were on duty or away from their place of work and residence and therefore initial access to the grab-bag was limited, especially given the immediate build-up of traffic around the major incident site.
37. The London Fire Brigade has recommended the use of Premises Information Boxes™ (PIBs) which would be located on six initial key sites. Pillar box red PIBs are prominent high security specification 'cupboards' providing security for key information that will support a major incident response. Designed to be weather resistant for external locations, the PIB provides a recognised focal point for attending fire crews without the reliance on power or LALOs being present.

Pollution Plume Monitoring

38. The Wanstead Flats Fire resulted a significant smoke plume that was discernible across East and South London. U.S. Research on possible smoke-related pollution events indicate that wildfires can generate adverse levels of particles smaller than 2.5 microns in diameter (less than one-quarter of the width of a human hair). These 'gritty' particles are small enough to get into a person's lungs. In heavy-enough concentrations, they can cause damage. The US Environmental Protection Agency (EPA) estimates biomass burning contributes

more than 25 percent of all small particle pollution (identified by the EPA as PM2.5) in the U.S.

39. Research teams have found that during the summer -- when the level of smoke coverage across the US. peaks -- about 52 percent of all PM2.5 air pollution events in the continental U.S. occur when smoke from forest fires is present. Wildfires are usually short-lived events in the UK and are not as significant as the U.S. experience, however, the need to monitor significant incident smoke plumes needs to be properly considered.
40. Epping Forest will explore closer links with the Health Protection Agency; Public Health England; Environment Agency and the Health & Safety Executive and Local Authorities to better understand who the competent authority for monitoring pollution in such situations and how public safety information on low level pollution is best communicated to the public.

'Defendable Structures' Assessment

41. Given the continuous nature of Epping Forest with a range of 'high value' urban structures, such railways; residential properties; power sub-stations; pumping stations; telecommunications masts further work is required to ensure that these facilities are properly assessed and clearly communicated as risks to MAGIC Gold Commanders. The Fire Brigades define such items as 'Defendable Structures' (DS) and as such these facilities will now be mapped and added to the hydrant and fire gate mapping available to First responders.

Mapping availability

42. MAGIC Gold Command Centres are now internet enabled which makes sharing digital information far more efficient. This Autumn Epping Forest staff have transferred key Epping Forest Geographic Information System (GIS) mapping layers to the London Fire Brigade's GIS facility. Epping Forest GIS layers on fire gates; hydrant locations, habitat types and other key information can now be readily accessed by the Command Centre.

Firebreaks for Residential properties

43. Traditionally vegetation tends to be thicker and higher around the edge of sites, as it is often left as a screen between residences and the site. Residents often object to attempts to reduce this screening vegetation which is perceived as an aid to both property security and personal privacy. During 2018, a number of isolated residences sought reassurance from the City Corporation that vegetation close to their properties would be properly managed.
44. If properties are located behind thick screening, this can impede access to Fire Service teams bringing the risk of fire much closer to homes and people and ultimately making retention unacceptable under any fire risk assessment. Epping Forest will need to initiate and review Fire Risk assessments for adjoining properties. The UHP recommends that if management work is deemed necessary to reduce the risk it is worth informing residents of this with the help of the fire service, as they may be more accepting of the loss of a perceived security and privacy measure if they realise it will reduce the risk of fire damage to their property

Corporate & Strategic Implications

45. The protection of Epping Forest from wildfire supports the Corporate Plan 2018-2023 objective of:

Shape outstanding environments

- We are digitally and physically well-connected and responsive
- We have clear air, land and water and a thriving sustainable natural environment
- Our spaces are secure, resilient and well-maintained.

Open Spaces Department Business Plan 2016-19

46. The protection of Epping Forest from wildfire also supports the Open Spaces Business Plan objective:

46.1 Our spaces are secure, resilient and well-maintained: b) Build resilience to natural and man-made threats by strengthening, protecting and adapting our infrastructure, directly and by influencing others.

46.2 Open spaces and historic sites are thriving and accessible: 2) London has clean air and mitigates flood risk and climate change.

Implications

47. **Legal:** Byelaw(3)(6) clearly prohibits the '*Making or starting in the Forest any bonfire or other fire of any substance ...*'

48. **Financial:** In addition to the considerable draw on staff time during the summer of 2018, the cost of the fires has had a significant impact on the 2018/19 Epping Forest Local Risk budget with the cost of additional equipment; employment of contractors and the restoration work at the Wanstead Flats Site of Special Interest amounting to £25,600.

Health Implications

49. The 3 days fire produced a substantial plume of smoke which could be seen across East London.

Conclusion

50. The implementation of the 2013 Epping Forest Wildfire Improvement Plan through a mix of improved staff information and training; expanded mapping; additional equipment and improved communication has enhanced the ability of the Fire Brigade and Epping Forest Teams to manage a significant number of wildfires across Epping Forest.

51. Six further improvement learning points have been identified through the 2018 wildfire events and this learning will be integrated within the wider WIP learning and shared across the Department. Climate change appears to be driving the frequency of drought events and therefore greater attention and investment will be necessary to manage the increasing likelihood of major fire events within the Forest.

Appendices

- Appendix 1 – Summary of Epping Forest Wildfire Improvement Plan 2013
- Appendix 2 - 2018 Epping Forest Fire Log (15.07-13.10)
- Appendix 3 – Epping Forest Fire Gate Locations

Background documents

Rahiz, M. and New, M. (2013) 21st Century drought scenarios for the UK. *Water Resources Management*, 27(4): 1039-1061.

Aaron S. Kaulfus, Udaysankar Nair, Daniel Jaffe, Sundar A. Christopher, Scott Goodrick. **Biomass Burning Smoke Climatology of the United States: Implications for Particulate Matter Air Quality.** *Environmental Science & Technology*, 2017; 51 (20): 11731 DOI: [10.1021/acs.est.7b03292](https://doi.org/10.1021/acs.est.7b03292)

Urban Heaths Partnership. 'Fighting Fires with LIFE' (2009) A Best Practice guide for Fire Risk Assessment and Management

Martin Newnham

T: 020 7332 5310

E: martin.newnham@cityoflondon.gov.uk