Fleet Pond

Future Ecological Enhancement and Opportunities

J00696 V1.1

Client: Hart District Council

Date: 12 July 2021

DOCUMENT CONTROL

Report prepared for:

Hart District Council

Main contributors:

Matthew Johns BSc MSc CEnv MCIEEM MIFM FGS

Liz Johns BSc MSc CEnv MCIEEM MRSB

Jacob Scoble BSc GradCIWEM

Reviewed by:

Liz Johns

Issued by:

Matthew Johns

Green Tree House, 11 St. Margaret's Street, Bradford on Avon, BA15 1DA
T: 01225 723652 | E: info@johnsassociates.co.uk | W: www.johnsassociates.co.uk

DOCUMENT REVISIONS

Version	Details	Date
1.0	Draft for HDC consultation	30/03/21
1.1	Updated version incorporating HDC comments	12/06/21

Third party disclaimer

Any disclosure of this report to a third party is subject to this disclaimer. The report was prepared by Johns Associates at the instruction of, and for use by, our client named on the front of the report. It does not in any way constitute advice to any third party who is able to access it by any means. Johns Associates excludes to the fullest extent lawfully permitted all liability whatsoever for any loss or damage howsoever arising from reliance on the contents of this report. We do not however exclude our liability (if any) for personal injury or death resulting from our negligence, for fraud or any other matter in relation to which we cannot legally exclude liability.

TABLE OF CONTENTS

1 BACKGROUND

1.1 OVERVIEW

Fleet Pond is Hampshire's largest freshwater lake (21 hectares [ha] in size) and forms a key component of the Fleet Pond Site of Special Scientific Interest (SSSI) and Local Nature Reserve (LNR), which includes other habitats such as woodland and heathland. Fleet Pond is classed as a Heavily Modified Water Body under the Water Framework Directive, it is classed as a Reservoir under the Reservoirs Act and the water body is also classified as Main River by the Environment Agency. Fleet Pond is located on the eastern fringe of the town of Fleet at National Grid Reference (NGR) SU 820 549 and forms an extremely valuable historical, social, recreational and biodiversity resource for the local and wider community. Figure 1.1 provides an overview map of Fleet Pond.

Figure 1.1: Site Map for Fleet Pond

Over the years, the ecological and physical condition of Fleet Pond has deteriorated for a number of reasons including sediment deposition and reduction in lake depth, the presence of turbid water and nutrient inputs from urban runoff and wildfowl. The lake part of the SSSI was previously categorized as being in Unfavourable Declining condition by Natural England.

A partnership of organisations including Hart District Council, Natural England, the Environment Agency, Fleet Pond Society, MoD and Johns Associates, together with the Hampshire and Isle of Wight Wildlife Trust, Fleet Town

Council, Hampshire Ornithological Society, the local community and community groups have been working hard to initiate, deliver and maintain lake restoration initiatives.

In particular, to mitigate against the deterioration in the condition of the SSSI, a £1.2 million Phase 1 Fleet Pond Restoration Project (P1FPRP) was undertaken by the key Stakeholders to stop the immediate degradation of the lake and improve the conservation value of the SSSI. Although the SSSI is now regarded as being in "Unfavourable Recovering" condition it is a requirement of SSSI owners to manage their sites to "Favourable" condition, which in-turn is recognised and supported by the adopted Biodiversity Action Plan for Hart.

Plates 1 to 8 illustrate some of the variety in habitat, landscape and visitor experience provided by Fleet Pond.

Plate 1: Open water and fringing reedbed

Plate 2: Open water with created islands

Plate 3: Broadleaved woodland and footpaths

Plate 4: Information and educational opportunities

Plate 5: Running water – Brookly Stream

Plate 6: Running water – Gelvert Stream

Plate 7: Dry and wet heath

Plate 8: Wetland – marsh and pond

1.2 STATUTORY DUTIES

Hart District Council

Fleet Pond is owned by Hart District Council. This is a Freehold landholding, with its acquisition dating back to 1972. All tenure documents are held by the Legal Unit of Hart District Council at the Civic Offices: Civic Centre, Harlington Way, Fleet, Hampshire, GU51 4AE. Fleet Pond is managed as a Local Nature Reserve and Site of Special Scientific Interest by Hart District Council Countryside Services, as the owners of the land with overriding responsibility for the site.

Lead local flood authorities (LLFAs), such as Hart District Council, are responsible for managing the risk of flooding from surface water, groundwater and ordinary watercourses and lead on community recovery.

Hart District Council also has a wide portfolio of other statutory duties including environmental health, planning, tree protection and supporting community health and wellbeing, including through its network of green infrastructure and public open spaces.

Funding from HDC has fed directly into the Phase 1 FPRP and beyond.

Environment Agency

The Environment Agency has an important role to play in the regulation and management of Fleet Pond (including consideration of activities and environmental issues in the upper catchment). It is responsible for:

- regulating major industry and waste
- treatment of contaminated land
- water quality and resources
- fisheries
- inland river, estuary and harbour navigations
- conservation and ecology

It is also responsible for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea.

Funding from the Environment Agency has fed directly into the Phase 1 FPRP.

Natural England

Natural England's purpose is to help conserve, enhance and manage the natural environment for the benefit of present and future generations, thereby contributing to sustainable development. Its priorities for 2020 to 2025 support its mission and the ambitions of the government's 25 Year Environment Plan. Natural England's aims are for:

- a well-managed Nature Recovery Network across land, water and sea, which creates and protects resilient ecosystems rich in wildlife and natural beauty, enjoyed by people and widely benefiting society
- people connected to the natural environment for their own and society's wellbeing, enjoyment and prosperity
- Nature-based solutions contributing fully to tackling the climate change challenge and wider environmental hazards and threats
- improvements in the natural capital that drives sustainable economic growth, healthy food systems and prospering communities
- evidence and expertise being used by a broad range of partnerships, organisations and communities to achieve Nature recovery and enable effective regulation and accreditation

As a Site of Special Scientific Interest (SSSI), Natural England has a key role to play in providing specialist advice on Fleet Pond and its habitats, flora and fauna as well as regulating activities that could affect and influence the SSSI through granting Assents, which are required for works within the SSSI. Funding for certain works in the SSSI are also granted by Natural England.

Funding from Natural England has fed directly into the Phase 1 FPRP.

Thames Water

Thames Water is a statutory undertaker and provider of potable water and sewage treatment services within the Fleet area. It has a legal duty to ensure water quality and that environmental effects from its activities do not occur and where necessary, appropriate response and restoration measures are put in place. It also has a legal duty under the Natural Environment and Rural Communities Act 2006 to promote nature conservation through its activities.

Funding from Thames Water has fed directly into the Phase 1 FPRP.

Ministry of Defence

The Ministry of Defence (MoD) is a key landowner in the catchments that drain into, support and influence Fleet Pond. Historic military training has influenced and accelerated the erosion of soils in the upper catchment of the Gelvert Stream, much of which was historically transported into Fleet Pond. Key works were carried out to resolve this issue and recent inspections have demonstrated these measures as still largely working well. The MoD estate also has the potential to contribute to the ongoing recovery and longevity of Fleet Pond through nature based solutions that can promote the flow of clean, low nutrient, low sediment water to Fleet Pond, something that is critical for the water-dependent mosaic of habitats. This is especially important due to the poor water quality associated with certain storm flows arising from other catchments feeding into Fleet Pond from urban runoff.

The MoD also has a legal duty under the Natural Environment and Rural Communities Act 2006 to promote nature conservation through its activities.

Fleet Pond Society

Fleet Pond Society (FPS) is the voluntary group that exists to protect and manage Fleet Pond Nature Reserve. Although it does not have any statutory duties, from its inception on 28th April 1976 up to the formation of the Hart Countryside Service in 1994, virtually all management was by volunteers under FPS guidance. FPS's readiness to seek advice and expert guidance on the conservation management of a Site of Special Scientific Interest earned it the respect of Natural England. FPS has a close and positive relationship with the Hart District Council Countryside Rangers to ensure best use is made of the voluntary resources FPS can provide and thereby supports the delivery of a range of statutory duties. Its volunteers work to maintain the diversity of wildlife habitat at the Reserve including keeping the open heath and marsh areas free of invasive species; clearing footpaths of overhanging vegetation; repairing fences and strengthening the banks of streams against erosion. Some of the FPS donation and sponsorship funds have provided new facilities for the public, including a pond dipping platform, bench seating along footpaths and the popular viewing area, 'Lions' View', on the eastern side of the Pond.

Funding from FPS has fed directly into the Phase 1 FPRP and beyond.

1.3 OVERVIEW OF PRESSURES ON FLEET POND

Figure 1.2 sets out the key generalized pressures on Fleet Pond and the direct and indirect relationships between the pressures and the valued components of the environment at the lake. It shows that these have an overall cumulative negative effect on the environmental resilience of Fleet Pond (i.e. its inherent ability to maintain favourable condition and long term viability, with minimum intervention from humans). It also illustrates that this resilience is further threatened, and in some cases exacerbated by, the overarching influence of climate change on for example water availability and quality, temperature, and human behaviour).

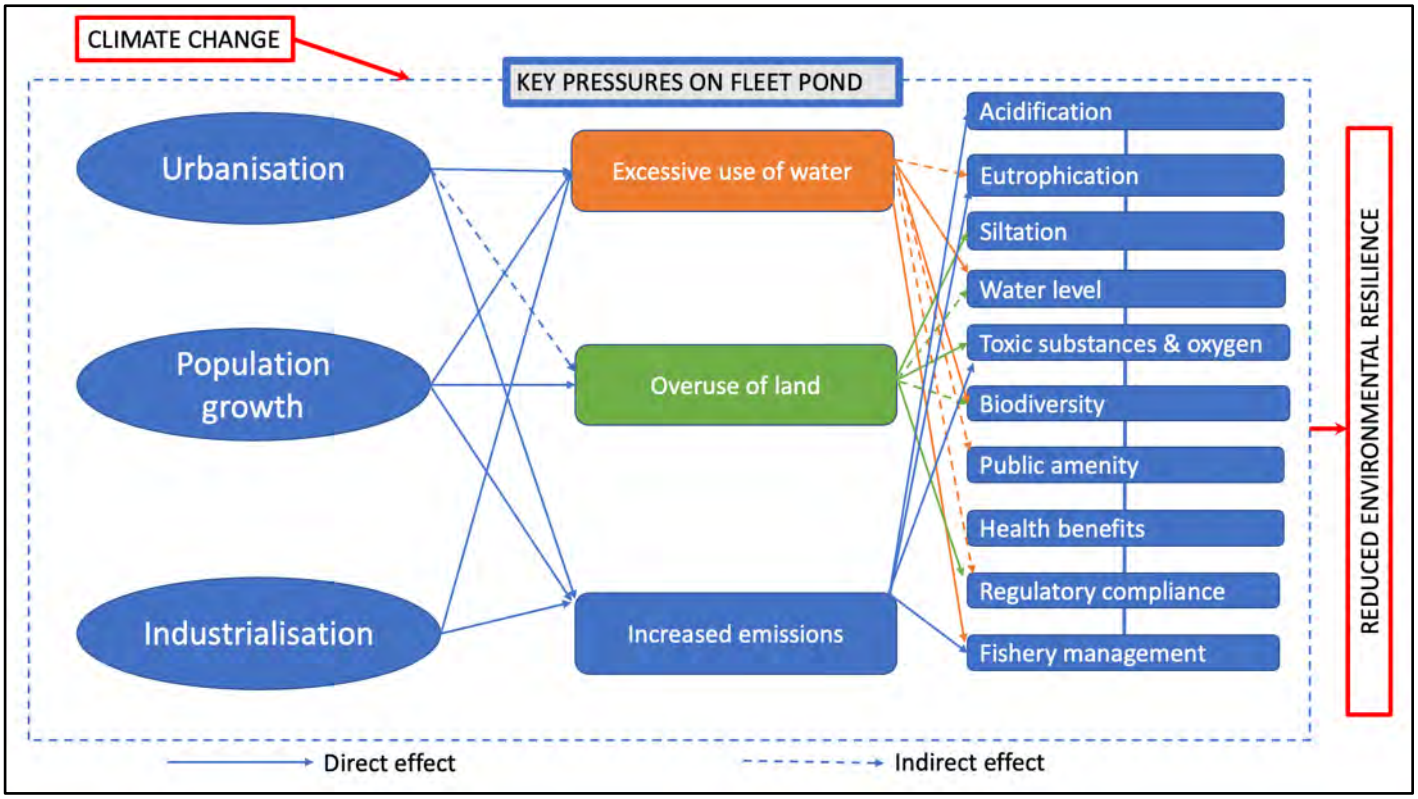


Figure 1.2: Generalised Pressures on Fleet Pond and its Long Term Resilience

1.4 STRUCTURE OF THIS REPORT

The remainder of this report sets out:

- Section 2 - Overview of the Phase 1 Fleet Pond Restoration project
- Section 3 – Overview of current funding streams and opportunities
- Section 4 – Key objectives from additional restoration opportunities
- Section 5 – A new Vision for Fleet Pond
- Section 6 – Future restoration opportunities

2 PHASE 1 FLEET POND RESTORATION PROJECT

A masterplan was produced by Johns Associates[1] on behalf of the Fleet Pond Restoration Project Steering Group to help guide the delivery of the Phase 1 Fleet Pond Restoration Project. The masterplan at that time (2012) is reflected in Figure 2.1. Not all of the measures shown on this plan were implemented, (e.g. creation of a dredged lake sediment receptor within adjacent MoD land and restoration to heathland), but where these can still be of relevance, they have been incorporated into latter parts of this report. Full details of the measures can be found in the masterplan report.

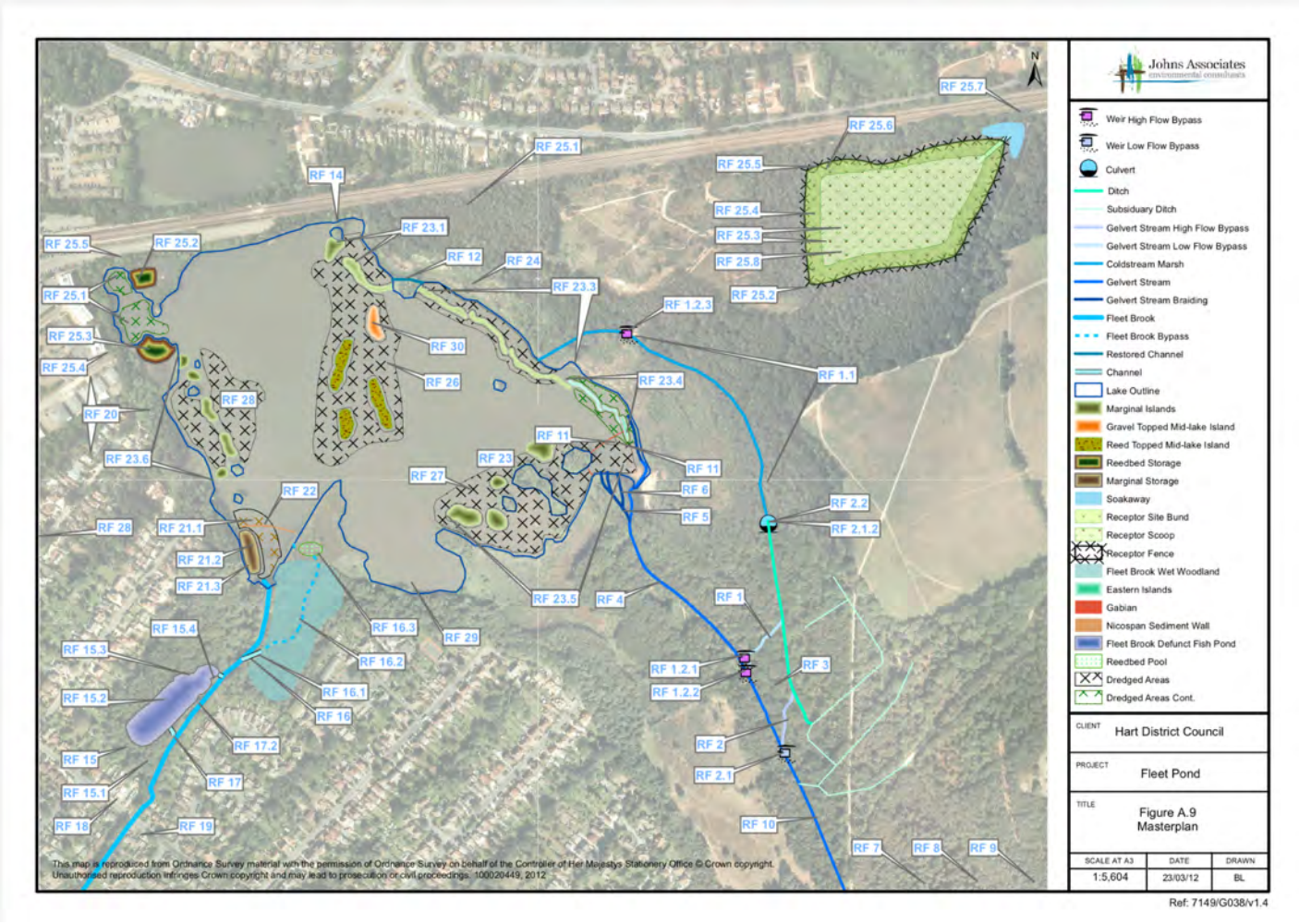


Figure 2.1: Fleet Pond Restoration Masterplan 2012

1 Johns Associates. 2012. Fleet Pond Restoration Project. Draft Masterplan V2.1.

In summary, the key work carried out between 2010 and 2017 included:

- Dredging of the lake bed, using some of the sediment to create a number of islands across the lake
- Creation of two overflow channels linking the lower right-hand bank of the Gelvert Stream to a restored boundary ditch and into Coldstream Marsh
- Provision of a replacement culvert and bridge adjacent to Coldstream Marsh
- Establishment of new reedbeds
- Provision of channel bank features to reduce erosion in vulnerable areas
- Clearance of scrub from Coldstream Marsh
- Creation of submerged geotextile fences to increase sediment deposition
- Dredging parts of the Brookly Stream
- Creation of a series of side channels and overflow points in the lower Gelvert and Brookly Streams
- Restoration of Brookly Pond
- Creation of a twin pipe overflow/ siphon system to divert higher flows from the Brookly Stream into the newly created Brookly Pond
- Creation of a new wetland feature (Avondale Pond) to retain sewage in the event of an emergency, and the provision of an information board at this location

Following the initial round of works and recent site visits there have been several key indicators of improvements within Fleet Pond, including:

- The removal of nutrient rich sediment from the lake bed to form new vegetated islands and marginal areas, potentially exposing older sediment with a rich seedbank. Recent site surveys carried out in 2019 found vegetation to be present on the lake bed in certain locations
- The nutrient rich sediment used to construct islands, where establishing marginal vegetation will utilise nutrients from the sediment, thereby removing them from the lake (especially if harvested)
- Recorded improvements in oxygen concentrations
- Reduction in recorded turbidity levels and an increase in water transparency. Recent site visits found the lake bed to be visible across the lake. This is likely a combination of managing sediment input sources such as at the Long Valley MoD Training Area and a more stable in-lake environment with less re-suspension of fine sediment
- Sediment deposition was found in the stream diversion and marginal areas constructed as part of the previous phase of restoration works
- Positive feedback from recreational users of the lake

There is a need to secure further funding to enable further and targeted key restoration and management activities to ensure the ongoing recovery of the lake and to build in resilience in terms of future pressures from (for example) changes in catchment management, growth in population, pollution and climate change.

3 CURRENT FUNDING STREAMS AND OPPORTUNITIES

3.1 FLEET POND MANAGEMENT PLAN

The Management Plan for Fleet Pond Local Nature Reserve (Hart District Council) draws on the expertise, knowledge, advice, recording and experience of many people involved in its management and conservation since it was acquired by Fleet Urban District Council in 1972. Among those whose work and support has contributed to the production of the Plan are: those employed by Hart District Council over the years as Wardens and Rangers; Fleet Pond Society, Fleet Pond Society Management sub committee and the associated Fleet Pond Conservation Volunteers.

The general policy of Hart District Council and Fleet Pond Society in respect of the management of Fleet Pond Local Nature Reserve is as follows:

General

Fleet Pond Nature Reserve will be managed in accordance with its status as a Site of Special Scientific Interest and Local Nature Reserve.

Close liaison will be maintained between Hart District Council and Fleet Pond Society for the effective management of the Nature Reserve.

Habitat/Species

Habitats within the Nature Reserve will be managed sympathetically to promote appropriate diversity whilst conserving a mosaic including: wetland, woodland and heathland. Management will aim to enhance habitat value to wild flora and fauna of all kinds occurring naturally on the site.

Access

Public access is freely available to the footpath network. The footpath network is managed to minimise disturbance to sensitive sites. Recreational facilities for the public are provided at the Sandhills Picnic Site and benches are located around the site.

Interpretation

Interpretative facilities are provided to encourage visitors to develop a greater awareness of the natural history and wildlife of the Nature Reserve.

Informal Recreation

Informal recreation activities will aim to provide a medium through which a greater awareness of the Nature Reserve can be bred. Any events will be sympathetic and appropriate to the Nature Reserve and will not conflict with nature conservation interests.

Landscape

The landscape of the Nature Reserve will be maintained and enhanced wherever possible in relation to the wider landscape identified in the Hart District Landscape Character Assessment.

Agreed management policy is as follows:

1. To manage Fleet Pond L.N.R. in accordance with its status as a Site of Special Scientific Interest and Local Nature Reserve.
2. To manage wildlife habitats sympathetically to conserve a mosaic including wetland, woodland and heathland and to enhance their value to wild flora and fauna of all kinds which occur naturally on the site.

3. To maintain facilities to encourage public access and informal recreation where such activities do not conflict with nature conservation interests.

4. To maintain a close liaison between Hart District Council and Fleet Pond Society for the effective management of the Nature Reserve.

3.2 PA2 COUNTRYSIDE STEWARDSHIP APPLICATION

During 2019 and early 2020, Johns Associates was appointed by Hart District Council to carry out a feasibility study into further restoration works at Fleet Pond, referred to as the PA2 Project[2], which focused on a series of agreed core objectives. This phase of restoration works would be managed by Hart District Council and funded through a successful application in 2021 to the Higher Tier of the Countryside Stewardship Scheme (CS). CS is a scheme that provides financial incentives for land managers/ farmers to look after their environment via several different methods such as: flood risk management, woodland creation and management, conserving and restoring wildlife habitats, encouraging educational access, reducing widespread water pollution from agriculture, keeping the character of the countryside and preserving historical features in the landscape. The focus of the CS application was enhancing lake macrophyte communities, further realignment of the lower Gelvert Stream, naturalizing the margins of the existing islands, re-wetting of Fugelmere Marsh, woodland management and improvements to ditches and water management through the use of sluices. It is recognised, however, that not all of the initiatives could be funded through CS, leaving certain opportunities requiring additional funding.

Objective 1: To ensure the existing Gelvert Stream diversion channels function effectively to manage sediment input to Fleet Pond and enhance wetland functionality including Coldstream Marsh.

The key components of delivering Objective 1 are:

- RP32 CS Option: Installation of two leaky dams including small amounts of bank and bed protection.

Objective 2: To increase the wetness of Fugelmere Marsh and increasing heterogeneity, restore natural function, increase the diversity of wetland habitats and biodiversity.

The key components of delivering Objective 2 are:

- RP32 CS Option: Installation of one leaky dam including small amounts of bank and bed protection.

Objective 3: To increase the diversity and abundance of lake aquatic macrophytes, invertebrates and zooplankton through the use of a range of techniques and features (including protection from grazing fish and birds).

The key components of delivering Objective 3 are:

- WN7 Option: Restoration of large water body through the translocation of bogbean, provision of new areas of water lily, provision of floating vegetated rafts, provision of planted island perimeters, reed habitat expansion through plug planting and harvesting of materials from Fugelmere Marsh, provision of a protective cage for plant recolonization and provision of woody debris reefs along island margins, dredging and removal of organic rich accumulated sediment from Brookly Bay and placement on adjacent island for future recolonization by plants.

- SB2 Option: Control of scrub at difficult locations focused on the lake islands and Brookly Pond to promote wetland macrophyte recovery

2 Johns Associates. 2020. Fleet Pond PA2 Feasibility Study Report.

- WN8 Option: Provision of new timber sluice to manage emergency storage/release of nutrient rich waters

Should this bid not be fully successful, the residual items not funded by CS would be taken forward and implemented through separate funding streams.

Figure 3.1 illustrates the proposed restoration opportunities that would be delivered through a successful PA2 funding application.

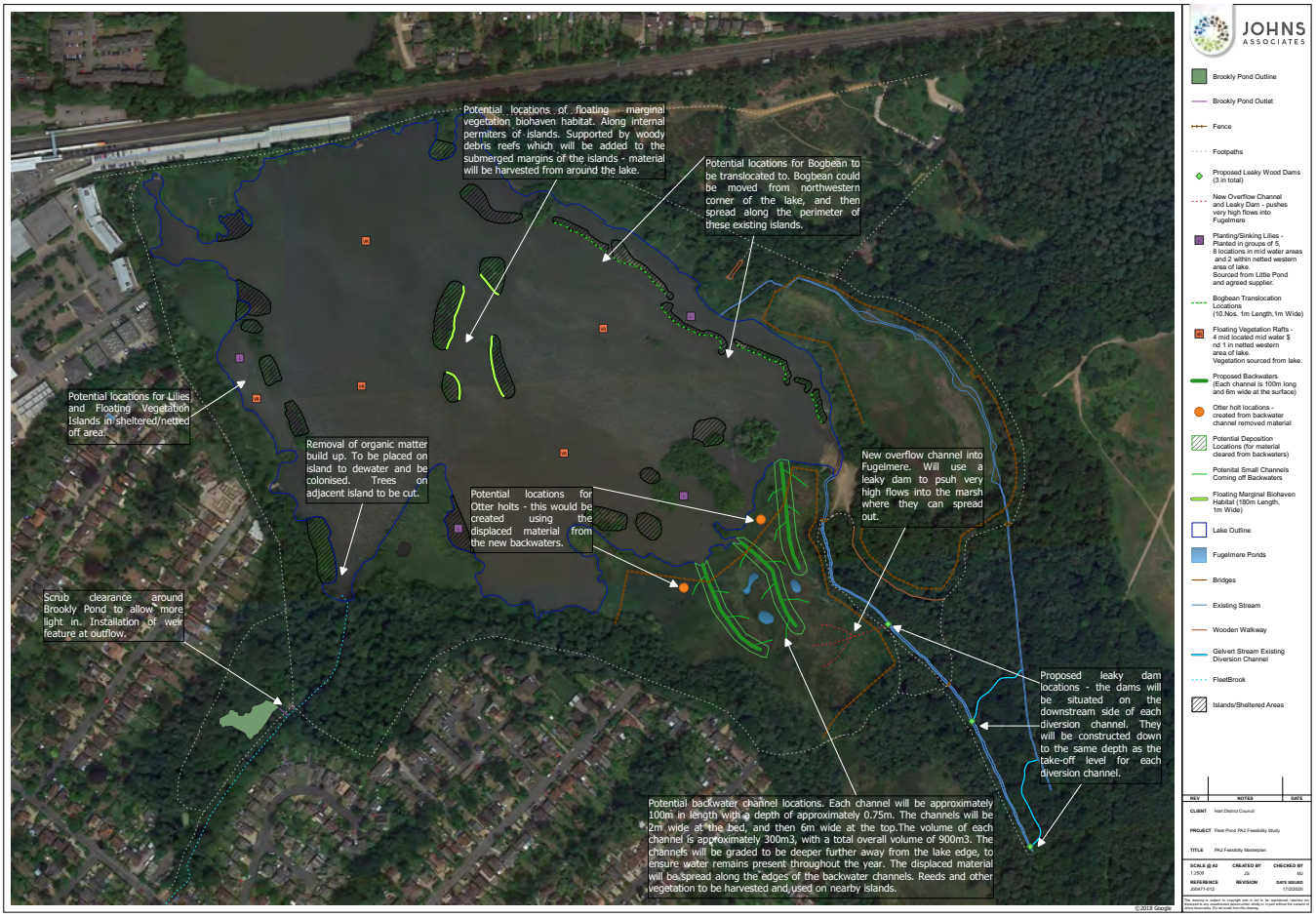


Figure 3.1: Proposed restoration opportunities to be delivered through a PA2 funding application

In addition to these main objectives, a series of wider objectives have been established through the PA2 project. These consider wider aspects around the lake, such as managing the Brookly Stream, managing nutrient levels, and ensuring future resilience to climate change. These are set out below:

- WO1: Implement a Range of Catchment Management and Diffuse/Pollution Management Measures to Control the Input of Nutrients and Other Deleterious Substances at Source
- WO2: Ensure the ongoing Maintenance and Monitoring of Sediment Management Measures in Long Valley and Bourley Valley CDU TSS
- WO3: Re-naturalise the Brookly Stream Planform and Function and Relationship with its Floodplain, Maximise Ecosystem Service Provision and Remove Anoxic Standing Waters and Reduce Litter Inputs to Fleet Pond
- WO4: Manage Nutrient Levels and Controls in Fleet Pond – Particularly the Reduction of Phosphorous

- WO5: Ensure Future Resilience to the effects of Climate Change and Growth in Local Population and Associated Urban Impacts
- WO6: Maximise Opportunities for Re-wilding, Delivery of Ecosystem Services, Natural Flood (and other environmental) Management Techniques
- WO7: Ensure Regular Appropriate Management and Monitoring is Funded and Delivered as Part of Short to Long Term Budget and Resource Planning
- WO8: Ensure Compatibility and Avoidance of Duplication Between Fleet Pond Restoration Project Objectives and Wider Initiatives Associated with EA Flood Risk Management, Hartland Park Mitigation and Enhancement, Neighbourhood Plan Delivery and Thames Water Asset and Operational Plans

It may also be possible to implement some of the following at a future point.

- Creation of additional scrapes, gutters, direct connection to the Gelvert Stream or lowered surface to support the re-wetting of Fugelmere Marsh.
- Creation of additional wetland scrapes and ponds within the Gelvert Stream woodland and associated with the existing bypass channels.

3.3 ENVIRONMENT AGENCY FLEET FLOOD ALLEVIATION SCHEME

Historically, the Fleet catchment area was characterised by numerous small watercourses, many of which have been modified, diverted or culverted (through a pipe). The Environment Agency is aware that flooding within Fleet is caused by a combination of rivers, surface water and sewers exceeding capacity. In some locations, culverted watercourses are under-sized and therefore reduce capacity in the channel to convey higher flows. Where watercourses have been diverted, this has led to surface water ponding, with water unable to enter the watercourse. These are some of the factors leading to flooding issues locally.

The principal watercourses that drain the area are the Fleet Brook and Gelvert Stream which run from south to north and discharge into Fleet Pond, as well as Sandy Lane Ditch to the west of the town. These are tributaries of the River Hart in the Thames catchment. The watercourses rise south of Fleet and are mostly culverted through the town. The Basingstoke Canal also runs generally west to east through the town. In flooding terms, the catchment is described as very flashy with flood water rising within thirty minutes and then subsiding within an hour. The challenge therefore is to reduce the flashy nature of the watercourses. The Environment Agency will be investigating how this could be achieved by reducing the peak flows to such an extent that the culverts can convey sufficient flows, while also making space for the surface water that needs to be re-directed back into the watercourses.

Several options have been considered but no final decisions have been made for a flood alleviation scheme in Fleet. The Environment Agency wants to work with partner organisations to achieve the best possible outcomes for the area, and Natural Flood Management (NFM) is thought to be a key element of the best way to reduce flood risk. Initial assessments have identified that traditional construction type flood defence projects in isolation are unlikely to achieve a benefit score above 1, which is required for the scheme to progress further. NFM also has the potential to attract significant wider environmental benefits as well as funding support.

4 KEY OBJECTIVES FROM ADDITIONAL RESTORATION OPPORTUNITIES

4.1 KEY OBJECTIVES

Five objectives to help define, prioritise and drive forward future additional restoration opportunities have been set out below. These have been used to categorise and group the measures set out in Section 5 of this report.

1. Ensure biodiversity restoration, conservation and enhancement occurs to the maximium extent possible – delivering an overall biodiversity net gain through all activities associated with Fleet Pond and supporting the SSSI to meet Favourable Conservation Status.
2. Expand and integrate nature-based solutions for flood, sediment and water quality management (including climate change) as a priority and preference.
3. Building in enhanced biocarbon capture and ensure long-term carbon storage if achieved through management activities.
4. Promote and enhance recreation, health and wellbeing (within the context of successful delivery of the other objectives).
5. Facilitate and communicate the wider socio-economic benefits from ecosystem services through the delivery of these objectives.

5 VISION FOR FLEET POND

Example:

A thriving, biodiverse and resilient Fleet Pond that supports an outstanding assemblage of wildlife, extensive ecosystem services and the needs of the local community, measured at Favourable Condition with in-built capacity to adapt to the challenges of climate change and other pressures.

To be completed through consultation

6 FUTURE RESTORATION OPPORTUNITIES

6.1 OVERVIEW

As can be deduced from the preceding sections of this document, there is a long history of different organisations, (notably Hart District Council and the Fleet Pond Society), delivering a wide range of activities to support the management, restoration and long term health of Fleet Pond and the multiple benefits it provides to its own biodiversity, the wider environment, people and the town of Fleet.

It can also be seen that there remain a large number of inter-related pressures, influences and effects on Fleet Pond, both in terms of recovery and restoration, but also the introduction of new threats that can affect long term sustainability. This in turn undermines the wider ecosystem services Fleet Pond provides to people. With the prospect of a growing local population, it becomes ever more important to evaluate all opportunities to further the restoration of Fleet Pond, particularly those that enable nature-based solutions and build in long term environmental resilience to this much loved and valued natural resource. These need to be delivered as soon as possible to minimise the effects of change and a growth in population, together with other factors.

The remainder of this document sets out the output of an initial review of potential future restoration opportunities that will make a significant positive difference to Fleet Pond and help secure its long term future, particularly in response to population growth and pressure, water quantity and quality and climate change.

Specifically, these do not replicate those measures that would be delivered through the operational or statutory duties led by Hart District Council, or from a successful PA2 funding bid or other legal duties associated with owning and managing Fleet Pond.

6.2 APPROACH

A review of documents held by Hart District Council, Johns Associates, the Fleet Pond Society and from opensource data has been completed to inform this assessment. It builds on the long term knowledge and direct involvement in the management and restoration of Fleet Pond from all parties, who have worked together for over 14 years, longer for Hart District Councill and the Fleet Pond Society, and longer still for the Fleet Pond Society solely.

Key documents are listed in the bibliography at the end of this report.

An initial meeting held with Hart District Council, Fleet Pond Society and Johns Associates on 16th March 2021.

A follow up meeting was held between Johns Associates and Hart District Council on 22nd March 2021.

A site visit was completed on 25th March 2021.

Completing these tasks informed the selection of future restoration opportunities set out in this Section of the report.

Further consultation is proposed prior to finalising the list of opportunities and this document.

6.3 FUTURE OPPORTUNITIES

This section of the report sets out a draft list of future restoration opportunities that require funding and implementation. They have been grouped in terms of general locations around Fleet Pond, and then categorised in terms of the first four objectives set out in Section 4 (excluding socio-economic). Depending on how many of these categories can be delivered by each opportunity, a ranking from 1 to 4 is given (1 [highest] = all objectives delivered; 4 [lowest] = one objective delivered). It is recognized that this is a simplistic approach, but it is effective in helping proritise actions for urgent delivery, noting that all of these opportunities should be implemented in time as well!

Finally, those opportunities that deliver on all categories (ranked 1st by delivering on all 4 objectives) have been reviewed and those considered (from professional judgement) to have the highest positive and integrated impact

though biodiversity restoration, bioengineering or other accelerated means, are awarded a 'gold star' and should be seen as the key priority measures to be delivered on an urgent basis.

Table 6.1 sets out information on each draft objective including: location, reference, description, which objective it helps deliver on, and a weighted ranking to highlight priority actions.

Figure 6.1 illustrates the distribution of the restoration measures around the lake and Figures 6.1 to 6.5 show the distribution based on the different objectives.

A gazetteer of images reflecting locations associated with some of the opportunities are also presented at the end of this section.

Table 6.1 Draft Future Restoration Measures

Location	Reference	Proposal	OBJECTIVES - STACKED BENEFITS					
			Biodiversity	Solutions for water quantity and quality and sediment (including nature based)	Biocarbon capture and storage	Recreation, health and well-being	RANKING 1-4. (1 is highest)	WEIGHTED RANKING (Gold star awarded to nature based solutions for biodiversity and bioengineering or high impact opportunities for wider Fleet Pond area)
NW/NE section Boathouse Corner to Sandhills downslope at cattle water tank	1	Installation of rustic fencing along foot of embankment at Lower Path				Y	4	4
	2	Break up impacted surface soils to expose surving seeds	Y				4	4
	3	Seek Natural England permission to seed with native bluebell and other ground cover vegetations. Manage restored flora	Y	Y	Y	Y	1	1
	4	Use sand/clay dredged from Sandy Bay to cover exposed tree roots and seed/manage as per 3.	Y	Y	Y	Y	1	1
The Flash Pool	5	Extend south-eastwards to compensate for reduced open water area resulting from new bund across the northern end	Y			Y	3	3
Brookly Wood	6	Dredge leaf litter to restore stew ponds and canal / ditches organic material placed on bank for carbon storage.	Y		Y	Y	2	2
	7	Protective handrail on stew pond closest to footpath				Y	4	4
	8	Replace fencing around Thames Water Settlement pond with hand-high rustic timber fence				Y	4	4
	9	Deepen downstream diversion channel (lowered inlet) to permit more frequent flow, supported by leaky dam downstream	Y	Y	Y		2	2
	10	Removal of brick weir constructions near the junction with Gelvert Stream				Y	4	4
	11	Significant management of holly within woodland and create more opportunities for flood water to access lower areas for rewetting/sediment deposition.	Y	Y	Y	Y	1	1

Location	Reference	Proposal	OBJECTIVES - STACKED BENEFITS					
			Biodiversity	Solutions for water quantity and quality and sediment (including nature based)	Biocarbon capture and storage	Recreation, health and well-being	RANKING 1-4. (1 is highest)	WEIGHTED RANKING (Gold star awarded to nature based solutions for biodiversity and bioengineering or high impact opportunities for wider Fleet Pond area)
Gelvert Stream Corridor	12	Connect upper inflow to in-wood ditch network and diversion channels to direct flow from east/pyestock boundaries into new wetland habitats before entering lake and away from main channel and Sandy Bay.		Y	Y		3	3
	13	Formalise existing leaky dam on upper diversion channel to prevent further erosion. March 2021 shows that one log is sufficient to promote this working, in tandem with canal overflow water		Y			4	4
	14	Liase with Basingstoke Canal Trust to ensure overflow water is directed to Gelvert rather than. Brookly as a priority to prevent cleaner runoff to Fleet Pond (ie. Not mobilising urban sediments and access to wetland biotreatment areas).		Y			4	4
	15	Consider bankside planting and low fence to limit dog access and poaching to designated areas only, which would be reinforced.		Y		Y	3	3
	16	Create new open channel from lower Gelvert to Fuglemere Marsh with new footbridge over. Install leaky dam downstream to promote flows into Marsh	Y	Y	Y	Y	1	1
	17	Consider the upper diversion channel as the primary flow path for the Gelvert? Retaining all other channels as overflow/secondary flow paths?		Y			4	4
	18	Install soft engineered bank protection and in-channel woody deflectors/berms to prevent further bank erosion and also to diversify low flow habitats and maintain flow.		Y		Y	3	3
	19	Gravel cover on footpath from Guildford Road access to the Flash Bridge				Y	4	4

Location	Reference	Proposal	OBJECTIVES - STACKED BENEFITS					
			Biodiversity	Solutions for water quantity and quality and sediment (including nature based)	Biocarbon capture and storage	Recreation, health and well-being	RANKING 1-4. (1 is highest)	WEIGHTED RANKING (Gold star awarded to nature based solutions for biodiversity and bioengineering or high impact opportunities for wider Fleet Pond area)
Residential Side of Fleet Pond	20	Install a map board at Guildford Road access				y	4	4
	21	Replace or upgrade fencing along the reedbed edge from Chestnut Grove to the Wellington Reedbed viewpoint				y	4	4
	22	Install dog-proof fencing or low level netting on fences along the Chesnut Grove to Wellington Avenue access points				y	4	4
	23	Discuss with Network Rail the removal of steps at the Flash Culverts				y	4	4
	24	Installation of signage that the entrance to the footpath opposite the station building main entrance as it is safer and access is easier				y	4	4
	25	Replacement of fencing enclosing NE Marsh, Coldstream Marsh and Fugelmere Marsh				y	4	4
North/North-eastern Side of Fleet Pond	26	Gravel covering to create a gradient on the footpath from Boathouse Corner to Lions View to increase runoff				y	4	4
	27	Add material to slope from upper footpath to lower path where the slope from the MoD field joins to combat erosion				y	4	4
	28	water quality	y	y			3	3
	29	Water quality monitoring/baseline		y			4	4
	30	Baseline and monitoring of botanical aspects (especially on islands)	y				4	4
	31	Maintenance dredging	y	y			3	3
	32	Exclusion of urban run-off from lake via measures suggested	y	y			3	3

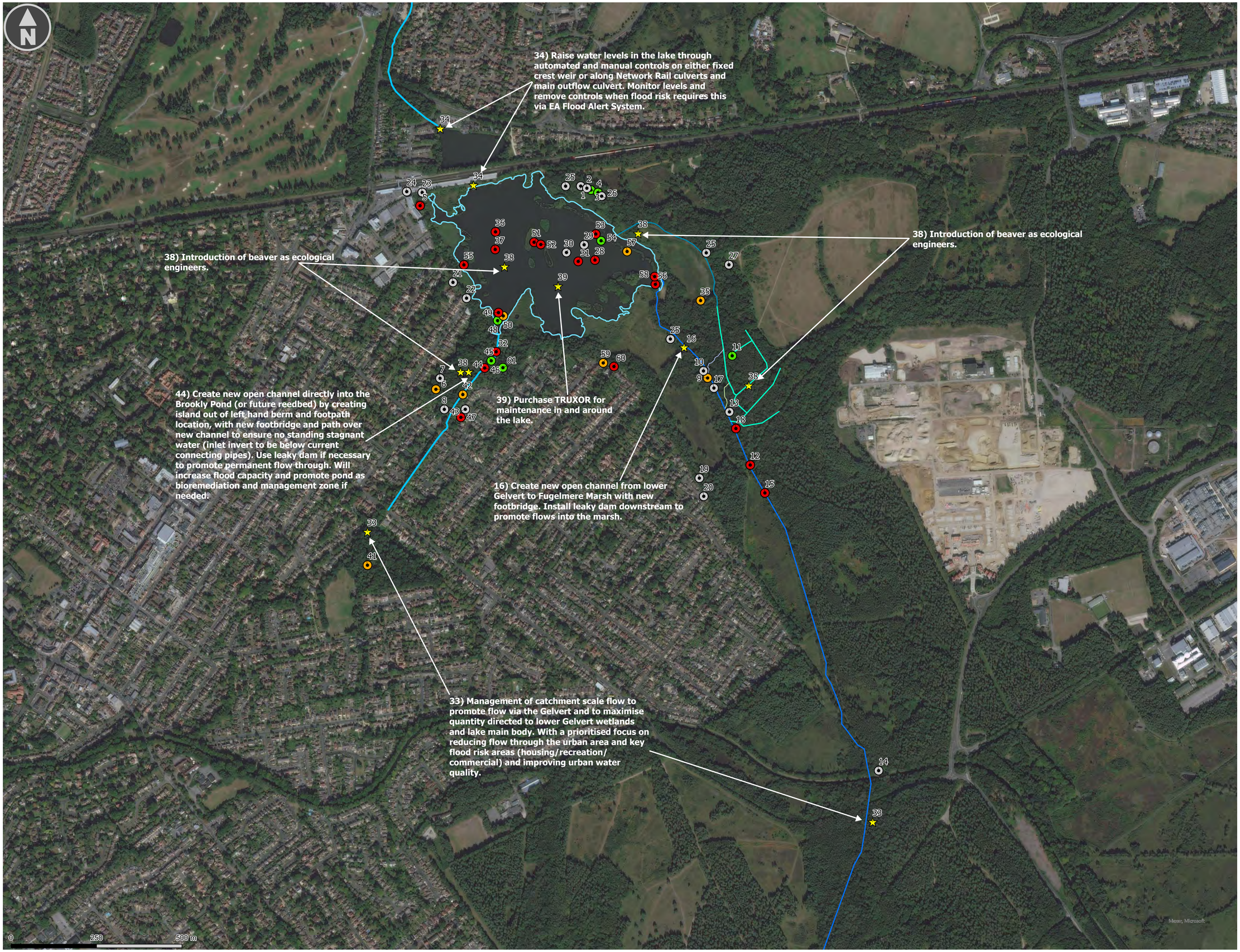
Location	Reference	Proposal	OBJECTIVES - STACKED BENEFITS					
			Biodiversity	Solutions for water quantity and quality and sediment (including nature based)	Biocarbon capture and storage	Recreation, health and well-being	RANKING 1-4. (1 is highest)	WEIGHTED RANKING (Gold star awarded to nature based solutions for biodiversity and bioengineering or high impact opportunities for wider Fleet Pond area)
Brookly Stream	43	Management of invasive species - bamboo	y				4	4
	44	Create new open channel directly into the Brookly Pond (or future reedbed) by creating island out of left hand berm and footpath location), with new footbridge and path over new channel to ensure no standing stagnant water (inlet invert to be below current connecting pipes). Use leaky dam if necessary to promote permenant flow through. Will increase flood capacity and promote pond as bioremediation and management zone if needed.	y	y	y	y	1	1
	45	Install and maintain leafy debris and urban litter trap on Brookly. Organic material to be relocated to specific wet woodland area for carbon storage.	y	y	y	y	1	1
	46	Restore overdeepened zone (fine sediment trap) below footbridge with sediment placed on bank for revegetation.		y	y		3	3
	47	Get local community involved in protecting the Brookly - reduce garden waste dumping etc.	y			y	3	3
	48	Suction dredge bay and add material to either new island (for shallow water plant estabishment and promoting flow towards outlet) or infill Brookly Pond to create reedbed (with new Brookly channel providing managed water levels).	y	y	y	y	1	1

Location	Reference	Proposal	OBJECTIVES - STACKED BENEFITS					
			Biodiversity	Solutions for water quantity and quality and sediment (including nature based)	Biocarbon capture and storage	Recreation, health and well-being	RANKING 1-4. (1 is highest)	WEIGHTED RANKING (Gold star awarded to nature based solutions for biodiversity and bioengineering or high impact opportunities for wider Fleet Pond area)
Brookly Bay	49	Creation of geotube bunds to replace the sediment fence at the mouth of the bay (link from reedbed to shoreline/island) and establish reedbed on this to trap organic materials in bay for recovery and carbon storage and to filter urban runoff whilst maintaining flow to open water environment.		Y	Y		3	3
	50	Provision of floating plant islands	Y	Y		Y	2	2
Islands	51	Naturalisation - removal/hiding geotextile banks				Y	3	3
	52	Individual objectives for each island: reedbed, gravel topped for terns and little tinged plover, scrub,, shallow aquatic plants,	Y			Y	3	3
	53	Small scale dredging/island 'topping up' on an ongoing basis	Y	Y			3	3
	54	Encouragement of aquatic plant management/ colonisation	Y	Y	Y	Y	1	1
Original fish exclusion area	55	Restore this function through the provision of weldmesh panels installed across gap between islands and relocation of fish to lake using traps, nets and electofishing. Creation of open, caged and floating plant nurseries to experiment on best approach and as a source of future plants. Receptor area for plants harvested from elsewhere. Sampling and monitoring to assess plant cover (drone and ROV provided by Johns Associates), zooplankon and transparency/turbidity.	Y	Y			3	3
Sandy Bay	56	Sediment removal required?		Y		Y	3	3

Location	Reference	Proposal	OBJECTIVES - STACKED BENEFITS					
			Biodiversity	Solutions for water quantity and quality and sediment (including nature based)	Biocarbon capture and storage	Recreation, health and well-being	RANKING 1-4. (1 is highest)	WEIGHTED RANKING (Gold star awarded to nature based solutions for biodiversity and bioengineering or high impact opportunities for wider Fleet Pond area)
	57	Use of geotubes filled with sediment to create new lake shoreline (e.g. 10 base and 3 m top) with channel between feature and existing shoreline, located along existing islands to convey Gelvert flow further into the lake, to contain sugnificant volume of lake sediment, to create new length of marghinal habitats to be planted with macrophytes and new footpath along top of structure. This is a mimic of the solution proposed in the very first Entec restoration study.	y	y	y	y	2	2
	58	Consider formalising the 'delta' deposits and extending the channel to the first island to promote flow behind this. Currently the delta is prograding into the lake and infilling behind the old (defunct) sediment fence).		y		y	3	3
Wellington Avenue/Chestnut Grove/Fugelmere Road/ Kenilworth/ Westover Road Path	59	Introduce plants and more overflow/biotreatment opportunities into ditch to manage urban runoff	y	y		y	2	2
	60	Thin scrub to increase opportunities to view lake	y			y	3	3
Kenilworth Wood	61	Create new channel through woods and then into diffuse flow paths before returning to Brookly Bay by reinstated former channel. Add leaky dam downstream of footbridge to achieve this, promoting flow to right hand side. Check levels to prevent flooding of perimeter path and gardens.	y	y	y	y	1	1

Location	Reference	Proposal	OBJECTIVES - STACKED BENEFITS					
			Biodiversity	Solutions for water quantity and quality and sediment (including nature based)	Biocarbon capture and storage	Recreation, health and well-being	RANKING 1-4. (1 is highest)	WEIGHTED RANKING (Gold star awarded to nature based solutions for biodiversity and bioengineering or high impact opportunities for wider Fleet Pond area)
MoD Field	62	Habitat-grassland restoration. Provide additional protection to key areas of habitat through either planting/scrub or traditional fencing, together with further recreational resources/furniture to help soak up pressure from Fleet pond paths.	Y			Y	3	3

Figure 6.1 Ecological Enhancement and Restoration Opportunities



JOHNS ASSOCIATES

- Coldstream Marsh
- Gelvert Stream High Flow Bypass
- Gelvert Stream Low Flow Bypass
- Ditch
- Gelvert Stream
- Fleet Brook
- LakeOutline

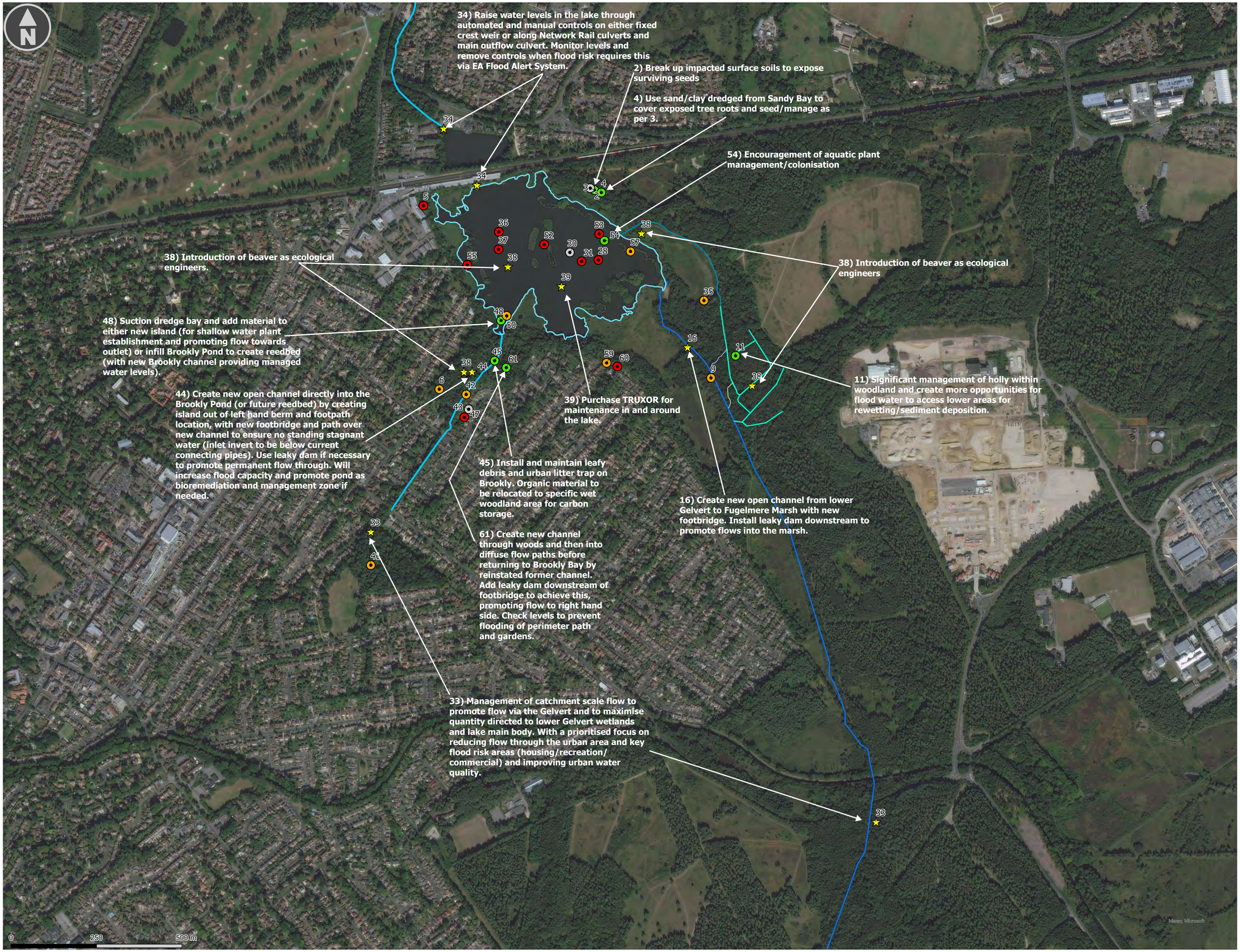
Restoration Opportunities
Ranking (1 = High, 4 = Low)

- 1* High Impact/Benefit Opportunities
- 1
- 2
- 3
- 4

CLIENT	Hart District Council
PROJECT	Fleet Pond Ecological Enhancements and Opportunities Scoping Study
TITLE	Restoration Opportunities

SCALE @ A1	CREATED BY	CHECKED BY
1:5,000	JS	MJ
REFERENCE	**REVISION**	**DATE ISSUED**
J00696-001		30/3/2021

Figure 6.2 Biodiversity Opportunities



JOHNS ASSOCIATES

- LakeOutline
- Coldstream Marsh
- Gelvert Stream High Flow Bypass
- Gelvert Stream Low Flow Bypass
- Ditch
- Gelvert Stream
- Fleet Brook

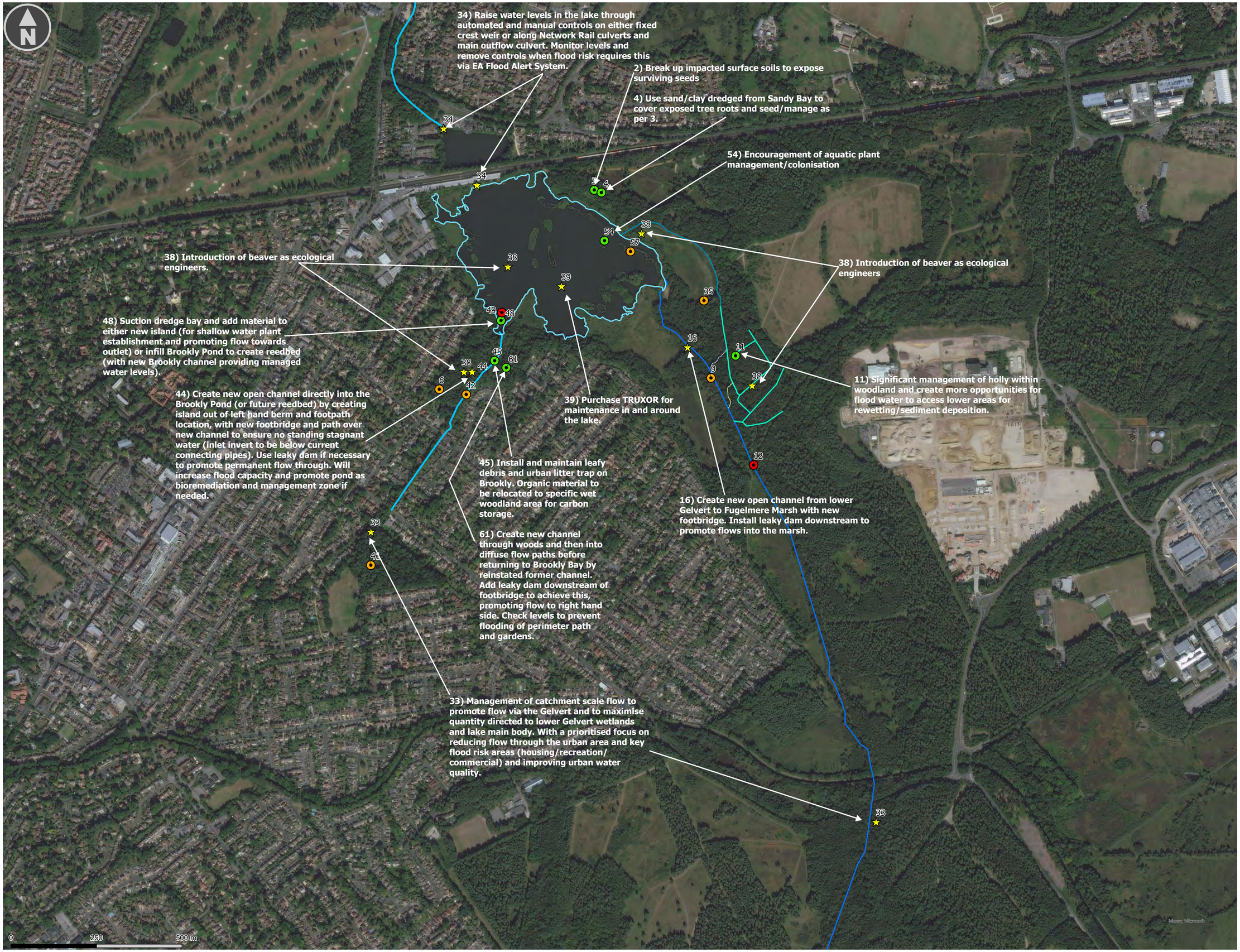
Restoration Opportunities
Ranking (1 = High, 4 = Low)

- 1* High Impact/Benefit Opportunities
- 1
- 2
- 3
- 4

CLIENT	Hart District Council
PROJECT	Fleet Pond Ecological Enhancements and Opportunities Scoping Study
TITLE	Restoration Opportunities (Biodiversity)

SCALE @ A1	CREATED BY	CHECKED BY
1:5,000	JS	MJ
REFERENCE	**REVISION**	**DATE ISSUED**
J00696-002		30/3/2021

Figure 6.3 Water Resource and Quality Opportunities



JOHNS ASSOCIATES

- LakeOutline
- Coldstream Marsh
- Gelvert Stream High Flow Bypass
- Gelvert Stream Low Flow Bypass
- Ditch
- Gelvert Stream
- Fleet Brook

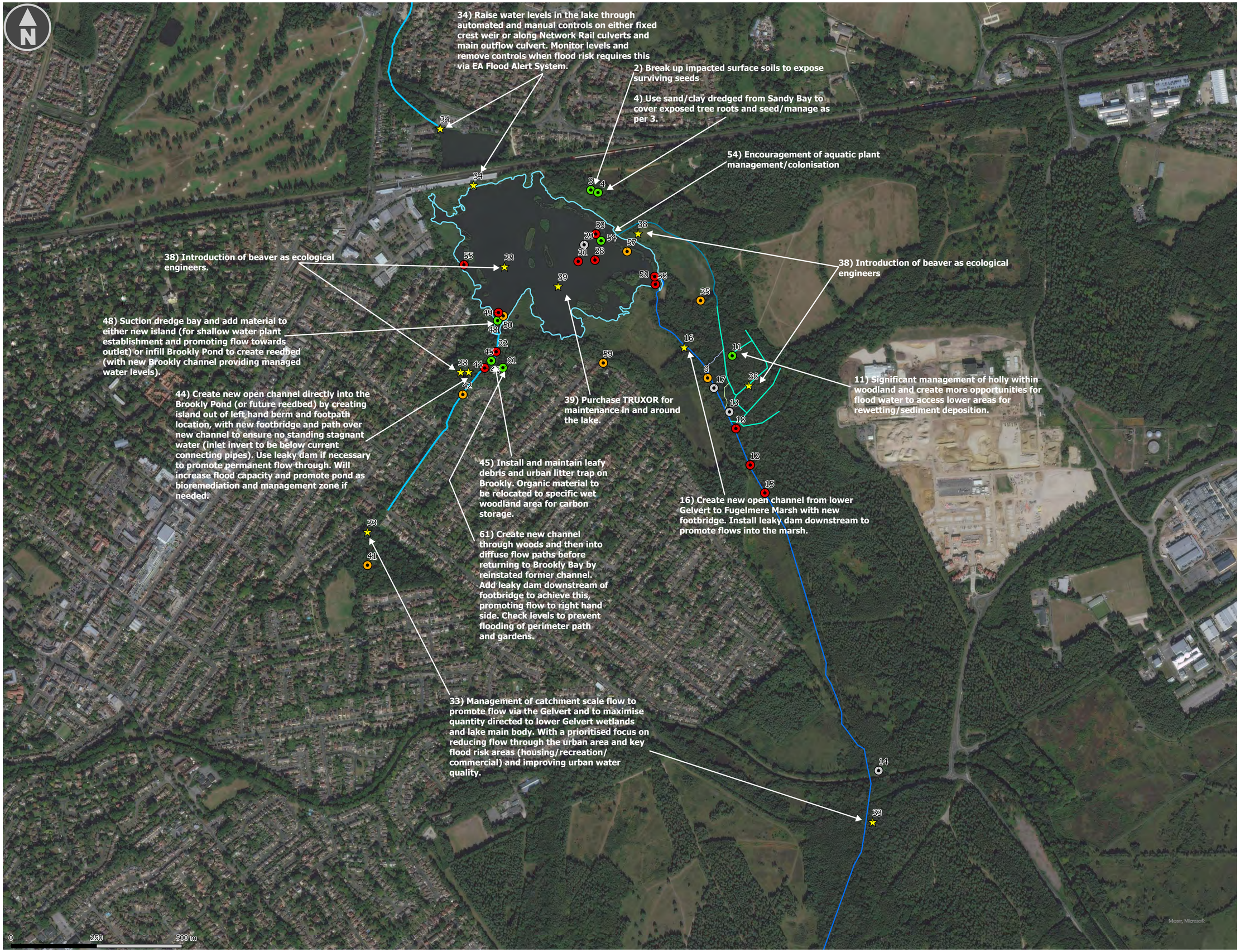
Restoration Opportunities
Ranking (1 = High, 4 = Low)

- 1* High Impact/Benefit Opportunities
- 1
- 2
- 3

CLIENT	Hart District Council
PROJECT	Fleet Pond Ecological Enhancements and Opportunities Scoping Study
TITLE	Restoration Opportunities (Carbon Capture)

SCALE @ A1	CREATED BY	CHECKED BY
1:5,000	JS	MJ
REFERENCE	**REVISION**	**DATE ISSUED**
J00696-004		30/3/2021

Figure 6.4 Carbon Capture Opportunities



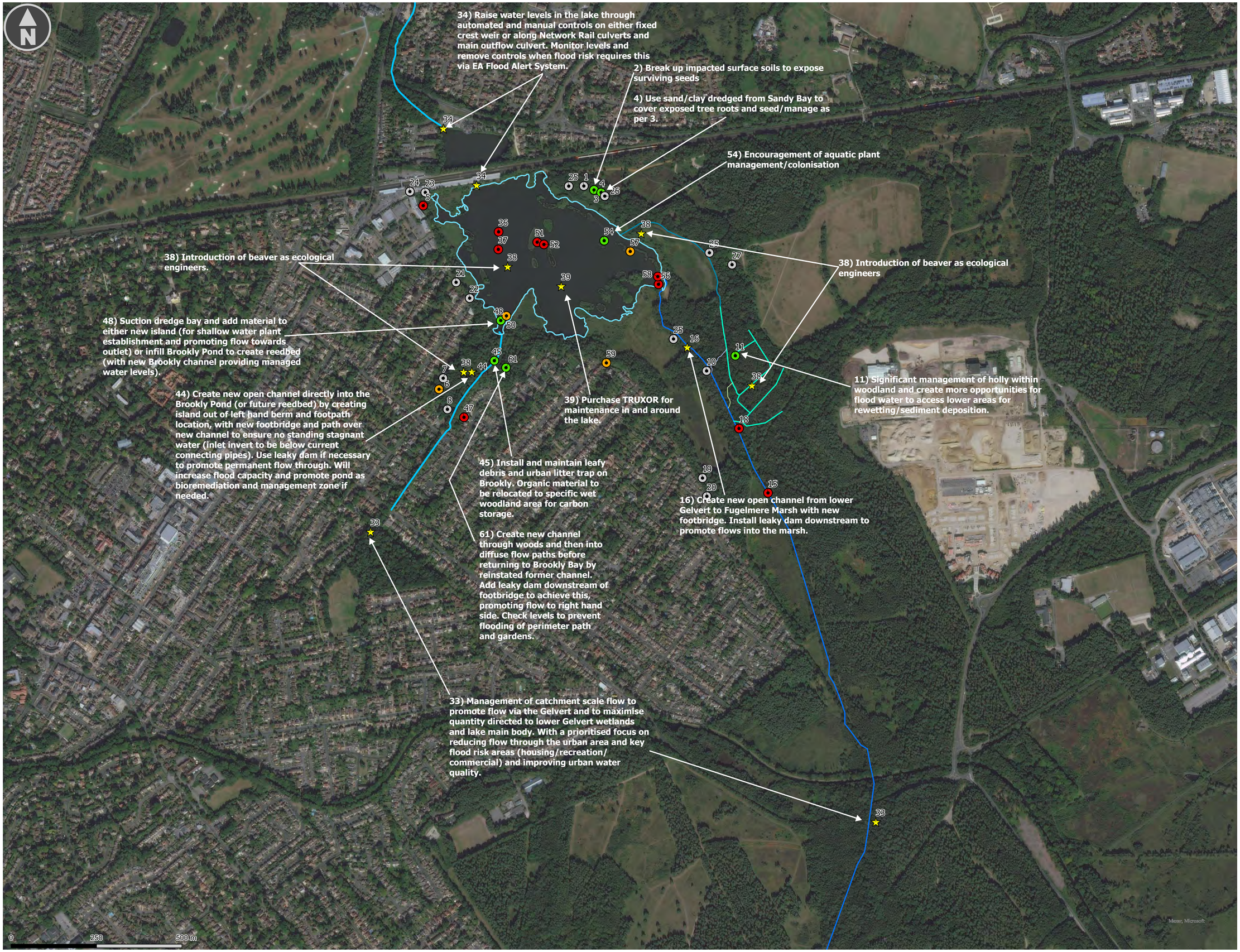
JOHNS ASSOCIATES

Restoration Opportunities
Ranking (1 = High, 4 = Low)
- 1* High Impact/Benefit Opportunities
- 1
- 2
- 3
- 4
- LakeOutline
- Coldstream Marsh
- Gelvert Stream High Flow Bypass
- Gelvert Stream Low Flow Bypass
- Ditch
- Gelvert Stream
- Fleet Brook

CLIENT	Hart District Council
PROJECT	Fleet Pond Ecological Enhancements and Opportunities Scoping Study
TITLE	Restoration Opportunities (Water)

SCALE @ A1	CREATED BY	CHECKED BY
1:5,000	JS	MJ
REFERENCE	**REVISION**	**DATE ISSUED**
J00696-003		30/3/2021

Figure 6.5 Recreation, Health and Wellbeing Opportunities



JOHNS ASSOCIATES

- LakeOutline
- Coldstream Marsh
- Gelvert Stream High Flow Bypass
- Gelvert Stream Low Flow Bypass
- Ditch
- Gelvert Stream
- Fleet Brook

Restoration Opportunities
Ranking (1 = High, 4 = Low)

- 1* High Impact/Benefit Opportunities
- 1
- 2
- 3
- 4

CLIENT	Hart District Council
PROJECT	Fleet Pond Ecological Enhancements and Opportunities Scoping Study
TITLE	Restoration Opportunities (Recreation, Health and Wellbeing)

SCALE @ A1	CREATED BY	CHECKED BY
1:5,000	JS	MJ
REFERENCE	**REVISION**	**DATE ISSUED**
J00696-005		30/3/2021

FLEET POND FUTURE RESTORATION OPPORTUNITIES – LOCATION GAZETEER

FLEET POND FUTURE RESTORATION OPPORTUNITIES – LOCATION GAZETEER

FLEET POND FUTURE RESTORATION OPPORTUNITIES – LOCATION GAZETEER

FLEET POND FUTURE RESTORATION OPPORTUNITIES – LOCATION GAZETEER

FLEET POND FUTURE RESTORATION OPPORTUNITIES – LOCATION GAZETEER

FLEET POND FUTURE RESTORATION OPPORTUNITIES – LOCATION GAZETEER

7 POTENTIAL CONFLICTS/SYNERGIES BETWEEN OPPORTUNITIES

The broad range of opportunities set out in Table 6.1 typically work well together and/or are geographically separate. These are explored further below:

- Works to stabilise and re-vegetate the slopes between Boathouse Corner to Sandhills is very local in extent and effect, with key synergies being on encouragement to deter unauthorised pedestrian access on the slopes. This is also similar for works associated with the Residential Side of Fleet Pond and the North/North-eastern side of Fleet Pond.
- Works to extend the Flash pool will interact with the adjacent drier areas of Fleet Pond, increasing wetter habitats. It also will interact with the project to improve the northern path, which will seek to improve the Flash as part of a package of mitigation/compensation.
- Works associated with access and safety within Brookly Wood are contained , whilst those associated with the former canal/ditches will interact with any proposals associated with the main Brookly Pond and downstream areas of Brookly Stream.
- The proposals associated with the Gelvert Stream Corridor are more varied, but are considered to offer a good level of synergy to reduce in-channel erosion and remobilization of urban pollutants, promoting the use of the existing diversion channels and opportunities to support wet woodland and marsh habitats, whilst depositing sediments and retaining greater levels of water in these areas. Diversion of more water into the Gelvert from the Basingstoke Canal could result in further channel adjustment and erosion, unless flow rates and managed and soft engineering measures are used for bank/bed protection. Additional water can also be managed through the addition of the proposed leaky dam and creation of an open channel to Fugelmere Marsh.
- A wide range of general Fleet Pond opportunities have been identified. The introduction of beaver and water vole as ecological engineers will have a significant positive response on water level and quality management, that will be complement and then replace short term measures such as leaky dams, promotion of the existing diversion channels, creation of scrapes. The water quality benefits of this will be supported by the wider initiatives in relation to urban runoff, sewage, sediment, and nutrients. The introduction of otter as a fish management tool will likewise support an improvement in lake water quality and bed sediment stability. Mechanical management through the purchase of a Truxor (or equivalent) would extend lake sediment, debris and vegetation management in the marginal and open water areas, enabling shorter to longer term maintenance in key areas.
- The proposed works associated with the Brookly Stream and Brookly Bay will modify the existing channel and pond in the vicinity of the works, but these are already believed to be impacted by both very limited flows in and the creation of still and anoxic water condition, alongside the potential for accidental inputs of sewage. As long as the proposals are well managed, with pollution prevention measures in place, the overall benefits will extend downstream and into the lake.
- Introduction of geotubes at Brookly Bay will result in positive effects in terms of fine sediment and organic debris, but will introduce further maintenance and consideration of implications for raising water levels upsteam needs to be considered.
- Proposed works to the islands and original fish exclusion area are focused on habitat restoration and enhancement and will be of direct benefit to the lake and its biodiversity. As previously experienced, fish exclusion is unlikely to be successful, but through the implementation of a fish (and grazing bird)

management plan, vegetation should establish to a point where it is self-sustaining, with management (e.g. by Truxor) potentially required.

- Works at Sandy Bay would result in the diversion of the primary flow path behind the first island, reducing sediment deposition at the bay. Extending this concept through the use of geotubes is only viable if significant funding is secured and permission is granted for the extensive dredging required to fill the geotubes. This would increase lake depth further, but may be considered as too great a level of disturbance in the lake, with effects on water quality and naturalness.
- Works proposed in Kenilworth Wood and western lakeshore areas all seek to improve local wetland condition, visual amenity and opportunities to improve water quality prior to discharge to the lake. These measures are aligned with other similar proposals throughout Fleet Pond.
- Enhancing the MoD field has the potential to improve habitat and species diversity alongside promoting recreational use, reducing pressure on other parts of the Fleet Pond. This is a self-contained project.

Liaison with a range of stakeholders will be necessary including Hart District Council., Fleet Pond Society, Environment Agency, Hampshire County Council, MoD, Thames Water and the public.

8 EVALUATING THE SUCCESS OF FUTURE OPPORTUNITIES

A range of methods can be employed to measure the success of the various opportunities promoted by this document. An example of these are set out below.

Physical and Water Chemistry surveys prior to works commencing and to establish a baseline that can also be used to monitor change including:

- Groundwater and lake level monitoring;
- (ideally) Continuous monitoring of flow and water quality exiting Fleet Pond using automated loggers and sensors as well as entering the lake on the Gelvert Stream and Brookly Stream above any habitat diversion features;
- Regular point sampling of water quality – including nutrients (comparing against previous records) and water transparency;
- Bathometric survey and sediment depth, referenced against lake water levels.

Habitat surveys prior to works commencing and to establish a baseline that can also be used to monitor change and model Biodiversity Net Gain using the Defra 3 Metric including:

- UKHAB survey, River Condition Assessment, Lake Habitat Survey (or latest equivalent);
- Imagery comparison (e.g. using Geographical Information Systems) to establish the extent of habitat evolution, and tree, scrub and wetland/emergent aquatic macrophyte coverage (could consider using Google Earth or aircraft, drone and unmanned underwater vehicle/underwater camera).

Biological surveys to establish a baseline and changes in diversity and presence/absence of indicator species

- Invertebrates;
- Plants – including repeat of previous surveys, NVC, SSSI Condition Assessment;
- Phytoplankton and Zooplankton;
- Fish;
- Otter/water vole/beaver;
- Invasive and Non-native Species.

9 NEXT STEPS

It can be seen from Section 6 that there are over 60 different opportunities that can make a different to Fleet Pond that should be delivered (Note: further review will confirm this) in addition to the existing operational/ statutory management being undertaken and a possible successful PA2 bid. In particular, this current analysis has highlighted the following as the 'gold star' initiatives that will deliver the best integrated solutions for the long term sustainable reliance of Fleet Pond:

- 16: Create new open channel from lower Gelvert to Fugelmere Marsh with new footbridge over. Install leaky dam downstream to promote flows into the Marsh.
- 33: Management of catchment scale flow to promote flow via the Gelvert and to maximise quantity directed to lower Gelvert wetlands and lake main body, with a prioritised focus on reducing flow through the urban areas and key flood risk areas (housing/ recreation/ commercial) and improving urban water quality.
- 34: Raise water levels in the lake through automated and manual controls on either fixed crest weir or along railway culverts. Monitor levels and remove controls when flood risk requires this via EA flood alert system.
- 38: Introduction of beaver as ecological engineers, alongside water vole and otter.
- 39: Purchase Truxor (or equivalent) for maintenance in and around lake.
- 44: Create new open channel directly into the Brookly Pond (or future reedbed) by creating island out of berm and footpath location, with new footbridge and path over new channel, to ensure no standing stagnant water (inlet invert to be below current connecting pipes). Use leaky dam if necessary, to promote flow through. Will increase flood capacity and promote pond area bioremediation and management zone if needed.

Funding opportunities are diverse, with many projects being funded through S106 funding from the Hartland Park development for the Fleet Pond Green Corridor. Some funding for specific projects may come from Countryside Stewardship, others being funded direct from Hart District Council and the Fleet Pond Society, with the potential for funding applications to be made for certain opportunities from other stakeholders including Thames Water, Environment Agency, Natural England, and the MoD. This could include upstream works in the wider catchment, which could also attract funding through the Government's Sustainable Farming Incentive, Local Nature Recovery and Landscape Recovery schemes. It may be appropriate to also consider applying for the National Lottery Community Fund.

This document has been reviewed by Hart District Council and this updated document will now be circulated to the Fleet Pond Society for its review and comments prior to a meeting to discuss the draft document, contents and opportunities identified herein and from the next round of consultation.

The output from this meeting will lead to an update to the opportunities, potential funding streams and the production of a final document.

The final document will be presented to Hart District Council, Fleet Pond Society and potentially other key stakeholders.