River Thames Scheme

Supplementary Consultation
3 September to 7 October 2024

Ferris Meadow Lake Options Appraisal Report

Appendix F - Water Quality Assessment

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1. Introduction

1.1 River Thames Scheme

The River Thames Scheme (the RTS or 'the project'), is a proposed project designed to reduce the risk of flooding for thousands of homes, businesses, and vital infrastructure along the River Thames while unlocking the river's economic, health, and environmental benefits between Egham and Teddington. The project incorporates a novel landscape-based approach to creating healthier, more resilient, and sustainable communities. It will establish new green and blue open spaces with recreational facilities and a nature recovery network, providing sustainable travel connections to link communities. The project:

- Includes an 8.3 km-long flood relief channel divided into the Runnymede Channel with (4.5 km) and the Spelthorne Channel (3.8 km). Both sections will generally be 20m to 50m wide (up to 100m wide at the water level control structures) and 3 to 4m deep, conveying an in-bank flow of approximately up to 150 m^3/s of water under flood conditions.
- Increases the capacity for 1km downstream of the Desborough Cut and at the weirs at Sunbury, Molesey, and Teddington.
- Enhances access to quality green open space, connections with wildlife, and support for a more sustainable travel network.
- Creates channel formation features, including flow and water level control structures, flood embankments, site compounds, materials reprocessing sites, Landscape Enhancement Areas and habitat creation areas.

During non-flood conditions, the project will allow water from the River Thames to pass through the channels and lakes to maintain flow conditions for fish passage and to prevent significant deterioration in water quality. This flow is referred to as the augmented flow. However, water extraction from the Thames, especially during low flow and drought periods, can affect the river's flow dynamics and quality and the available water volume for sustainable abstraction and navigation. Therefore, it is crucial to strike a balance between avoiding significant deterioration in water quality in the lakes and minimising the effects on flows and water quality in the Thames when developing an augmented flow procedure.

Baseline monitoring of surface waters and groundwaters has been and continues to be carried out for areas likely to be affected by the RTS and these data have been used within modelling studies to predict the possible changes in water quality. This has included modelling to predict impacts on surface water quality and flows within the River Thames, the channels and lakes. Within the channel sections modelling was used to predict changes in lake levels, water quality, lake residence times, groundwater levels and flow pathways, and sediment movement and deposition.

1.2 Study area

Ferris Meadow Lake (referred to as FML (and on some occasions, Ferry Lane Lake or Ferry Lake) in the rest of this report), is one of the lakes that could be affected by the

RTS, specifically, by the Spelthorne Channel. The FML is an offline body of water connected to the River Thames through the Chobham Bagshot Beds groundwater body (GB40602G601400) and during seasonal flood flows in the Thames. In addition, there are three smaller lakes referred to as Ferry Lane West Lakes 1, 2, and 3 (see FML Environmental Options Appraisal – Annex 1, Water Environment Study Area (ENVIMSE500260-CBI-ZZ-3ZZ-DR-EN-00141)). The FML is not classified as a water body under the Water Framework Directive (WFD).

There are no statutory designated sites within 500m of the FML although it is also recognised for its role in supporting the South West London Waterbodies Special Protection Area and Ramsar Site by providing an open water habitat for two key species of migratory birds (Gadwall, *Anas strepera* and Shoveler, *Anas clypeata*). Aquatic Invasive Non-native Species (INNS), Himalayan (Balsam *Impatiens glandulifera)* and Canadian waterweed *(Elodea canadensis)* are present within the lake.

As with other lakes in the area, FML is within the Lower Thames Drinking Water Protected Area and Safeguard Zone (Cookham-Egham-Teddington). Drinking Water Safeguard Zones (Surface Water) are catchment areas that influence the water quality for their respective Drinking Water Protected Area (Surface Water). They are identified where the protected area has been assigned as being "at risk" of failing the drinking water protection objectives of the Water Environment (Water Framework Directive) (England & Wales) Regulations 2017.

The FML itself is privately owned and maintained by ‘Shepperton Open Water Swim’, which provides paid-for open-water swimming facilities to the general public in the summer months (April to September). Although not a designated Bathing Water, it is maintained and used for recreational activities such as bathing, boating, and other water sports. Because of that, the lake owners have expressed concerns about the water quality implications of the RTS on the FML, i.e. they have concerns that water introduced from the River Thames may cause a deterioration in water quality which will affect its use as a swimming lake.

The FML could be affected by the direct connection to the River Thames through the Spelthorne Channel.

1.3 Purpose of this report

This report includes relevant information taken from water quality assessments, numerical modelling, review of scientific studies and field surveys undertaken to support the development of the RTS. The main element of the report (section 3) focuses on the current RTS proposal (or ‘Option 1’) to pass the flows from the Spelthorne Channel through the FML, as assessment work to date has only considered this alignment. This helps aid understanding of the impacts of the RTS passing through the lake.

A summary of potential impacts from other design options on water quality is included in Section 4. The data and information used to inform this report includes:

- Water balance, groundwater, water quality and cohesive sediments integrated model report (DHI/Stantec, 2023) (referred to herein a the ‘Integrated model’)
    - The Integrated Model predicts the effects of the RTS on lake levels, residence times, water balances (including the flow and movement of groundwater to and from the lakes), water quality and sediment transport;
- UKCEH QUESTOR and Protech Modelling Report (UKCEH, 2023)
    - A QUESTOR model (a river model developed to simulate the two channels)) and a Protech model (a lake phytoplankton model) to simulate the augmented flow within the channels and the linked lakes and their impacts on phytoplankton growth and water quality as well as the implications under flow conditions within the River Thames outside of flood conditions;
- RTS water quality monitoring
    - This includes data for WFD physico-chem and chemical parameters as well microbial samples;
- The results from the preliminary assessment of effects as set out in Preliminary Environmental Information Report (PEIR) available at Statutory Consultation.

Using the available information this report sets out an overview of the understanding of the FML, specifically with regard to the potential impacts that could arise on water quality in the FML. This assessment of water quality effects has only utilised the studies and modelling work that specifically relate to the FML area and provide value to the appraisal process.

2. Baseline

The baseline was identified through a comprehensive process that involved a desk study and on-site surveys, as well as input from relevant stakeholders, such as local planning authorities, and landowners to acquire complementary baseline data. Baseline data on the FML has been collected since 2013, some of which is presented in this report as well as being used in the modelling.

2.1 Water availability

A baseline understanding of the water balance on FML in this report has been taken from the work undertaken on the Integrated Model (DHI/Stantec, 2023). This work created the baseline scenario, defined from a flow model representing the system that includes aquifers, lakes, and rivers. The model used secondary data on physiography, climate, hydrology, and hydrogeology and was calibrated based on a 2016/2017 'dry' year and a 'wet' year (2009/2010 calibrated to 2013/2014), which included a one in 20-year flood event. A summary of the results relevant to the FML are presented below. Within this report, when we refer to a 'dry' year we are referring to the model results for a typically average dry year with an augmented flow of 0.5 m^3/s and reference to the 'wet' year is an 'average' year but which includes a 1 in 20-year flood event, with an augmented flow of 1.0 m^3/s for the rest of the year. The model produces a time series of data under baseline (existing) conditions and for changes to for example, groundwater levels, lake levels and water quality, with RTS in place covering the area influenced by the Project. The Integrated Model uses Option 1 as the assumed channel alignment, model runs have not been undertaken for any other Options.

2.1.1 Lake levels

FML's average water level range is subject to clear seasonal variation, typically between 8.4m and 9.28m AoD. The total lake area averages 104,916m^2, while the lake's volume ranges from 283,954m^3 to 300,516m^3. Although since 2018 lakes levels have been variable and have deviated from seasonal patterns seen in the groundwater (DHI\Stantec, 2023), which may be due to changes in gravel extractions in the wider area.

According to the Integrated Model (DHI/Stantec, 2023), an annual water balance was calculated to assess the baseline for FML's lake levels, and a schematic diagram to illustrate the inflows and outflows to the lake (Figure 2.1 and Figure 2.2). This diagram highlights three components: (i) groundwater; (ii) overland water; and (iii) river discharge, which contains the water that currently passes through the lake.

Based on the analysis of water balances and lake volumes, the Integrated Model also calculated the estimated baseline residence time of FML based on the dry year and the wet year. The model output indicates that the residence time of FML before RTS is 299 days for the dry year and 25 days for the wet year.

This pattern is also seen in other lakes, as residence times during the wet year are generally shorter for all lakes incorporated into RTS due to increased stream and overland flows from widespread flooding in the catchment, as expected. Furthermore, the analysis of other lakes reveals that lakes currently disconnected from the system, such as FML, have longer residence times than lakes already connected to the river system.

Figure 2.1 and Figure 2.2 illustrate the FML's water balance (note that the lake is referred to as ‘Ferry Lane lake’ in the Integrated Model). The figures show the inputs and outputs, and the chart summarises the percentage of each water balance component and residence time. The modelling indicates that yearly rainfall heavily influences the lake's behaviour. During dry years, the water balance is primarily supported by groundwater, whereas during wet years, the water flow is mainly from overland.

Figure 2-1: Water balance diagram for baseline in the dry year (2016/2017), showing proportion of loses and sources of water (%) along with modelled volumes (m^3/year)

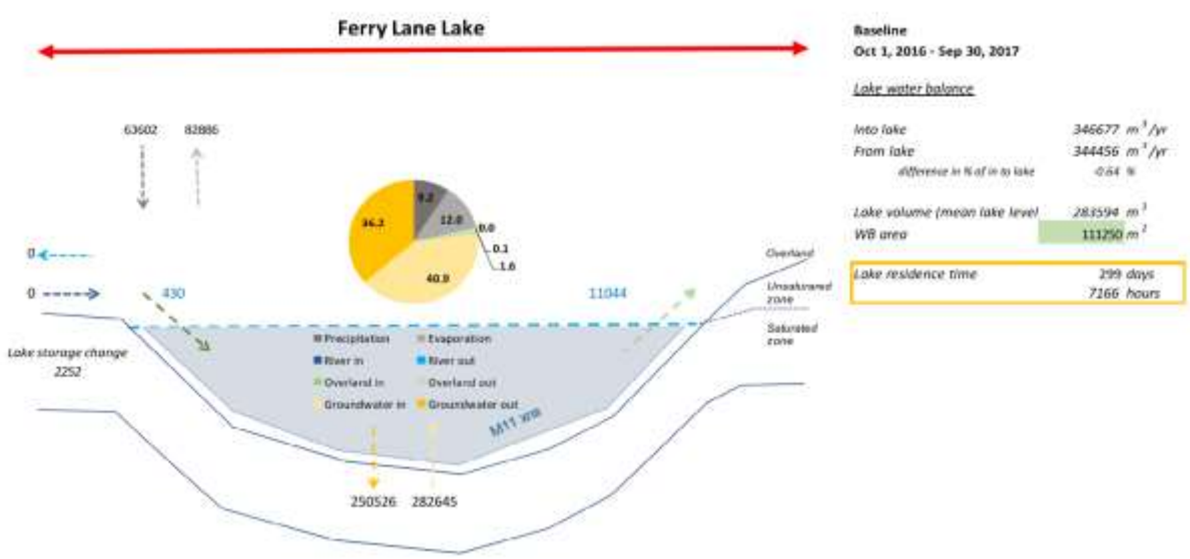
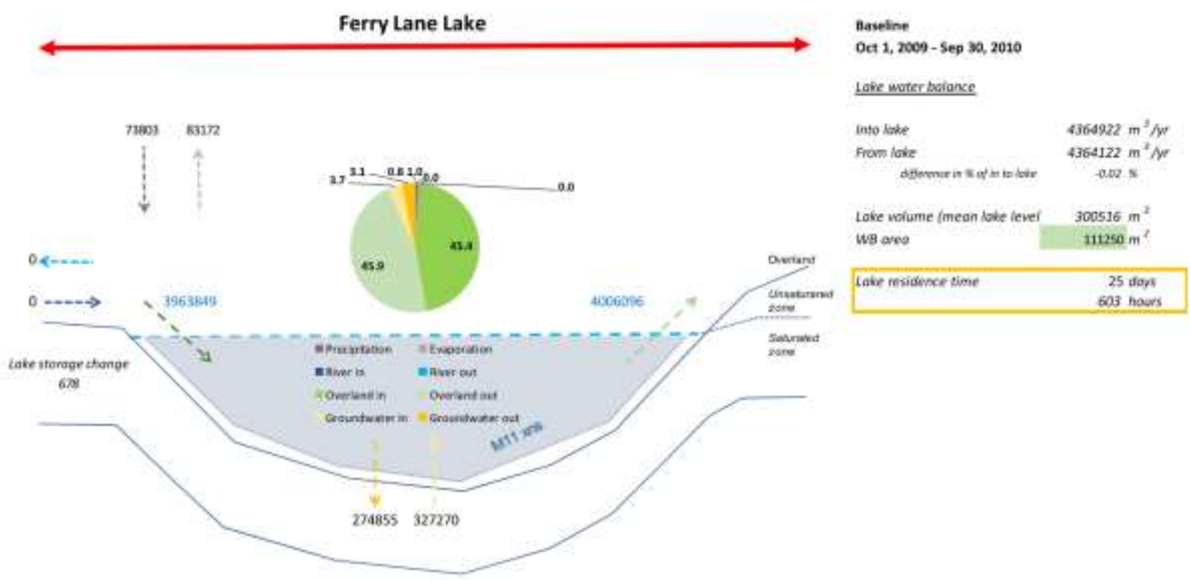


Figure 2-2: Water balance diagram for baseline in the wet year (2009/2010), showing proportion of loses and sources of water (%) along with modelled volumes (m^3/year)



FML is currently an offline water body (i.e. has no direct link with a river) that relies on groundwater during dry or normal conditions. In contrast, overland flow generally increases during the wet season for all lakes in the RTS. During the wet periods, most lakes are out of the bank for part of the time (including FML), resulting in considerable land inflows and outflows in the water balances (DHI/Stantec, 2023).

It is important to clarify that the data presented only pertains to the main FML, and does not include the smaller lakes, Ferry Lane West lakes 1, 2, and 3, identified in the vicinity. The smaller lakes are standing bodies of water adjacent to FML and are seasonally linked to the River Thames via a drain, which has no direct connection to FML. No data is available on these lakes' residence times. However, based on the likelihood they are in hydrological connected in a similar way to FML and are small in size, they are expected to have shorter residence times.

2.1.2 Groundwater levels

Modelling of groundwater in the DHI/Stantec Integrated Model was based on the need to understand the direction of regional groundwater flow.

The work undertaken indicates a complex relationship between the surface water system (lakes and streams) and the groundwater system. In the RTS region, it is understood that the River Thames is likely to represent a discharge limit for groundwater, although the river can lose water to the ground at certain times (especially during floods) and in specific locations (for example, where hydraulic structures such as weirs result in a steep hydraulic gradient; also in the vicinity of Chertsey, where groundwater abstraction can induce flow from the Thames).

Generally the degree of hydraulic connectivity and the direction of flow, between lakes and groundwater will depend on the permeability of the lake bed, and whether the lake water level is above or below the local groundwater level. FML lies on the bedrock geology of the Claygate member formation and the superficial geology of the

Shepperton gravel member, which forms part of the WFD groundwater body Chobham and Bagshot beds.

Monitoring data from RTS boreholes near FML, indicates that before 2018, lake levels were only slightly lower than corresponding groundwater levels. Still, the lake and groundwater level hydrographs have similar shapes (roughly following each other but vertically displaced), suggesting a good hydraulic connection between groundwater and surface water. The annual cycles are consistent with a seasonal groundwater recharge response and indicate that groundwater levels drive lake levels (DHI/Stantec, 2023).

2.2 Water quality

As part of the development of RTS, studies have been carried out to support water quality assessments, looking at pre and post environmental conditions when considering the construction and operation of the RTS. These studies have included the Environmental Options Appraisal (ENVIMSE500260-CBI-ZZ-3ZZ-RP-EN-10304), the Integrated Model Report (DHI/Stantec, 2023) and the QUESTOR/Protech Water Quality Report (UKCEH, 2023). Although each approach to analysing water quality parameters has different methodologies, the aggregate results make the assessment highly robust.

2.2.1 Physico-chemical parameters

Water quality data from 2012 to 2022, including that for Total Nitrogen (Figure 2.3) and Total Phosphorus concentrations (Figure 2.4) indicates average concentrations of around 1mg/L and 0.06 mg\L respectively, which would be classed as "Good" for both parameters, if the water body was designated a lake WFD water body (since the lake is not a WFD water body, these comparisons are purely for illustration only). It is worth noting that the two highest measurements for Total Nitrogen were during the 2013/14 flooding, at approximately 2 and 5 mg/L. All results indicate average Total-N of 1.07 mg/L (classified as "Good” WFD status for lakes) between 2012-2022 and The average Total-P concentration is 0.06mg/l, which is on the boundary between "High" and "Good". Two samples in 2014 showed a phosphorus concentrations of more than 0.124 mg/L, representing a "Poor" WFD status, during the 2013/14 flood event.

As part of the investigations using the sample data collected, ‘potential’ WFD classifications (as FML is not a WFD water body) for FML were calculated and compared against the 2019 and 2022 classifications for the River Thames WFD water body as FML will potentially receive this water (see Appendix A for classification comparisons). The comparison was undertaken using EQSs for rivers to identify differences. Differences in classifications were noted in all the main physico-chemical parameters with FML generally having better water quality than the River Thames. The most significant differences were for phosphates (soluble reactive was used to enable comparison), which is theoretically ‘High’ in FML and ‘Moderate’ in the Thames and Ammonia which is classed as, ‘High’ in the Thames and theoretically ‘Moderate’ at FML.

Appendix F: Ferris Meadow Lake Water Quality Assessment

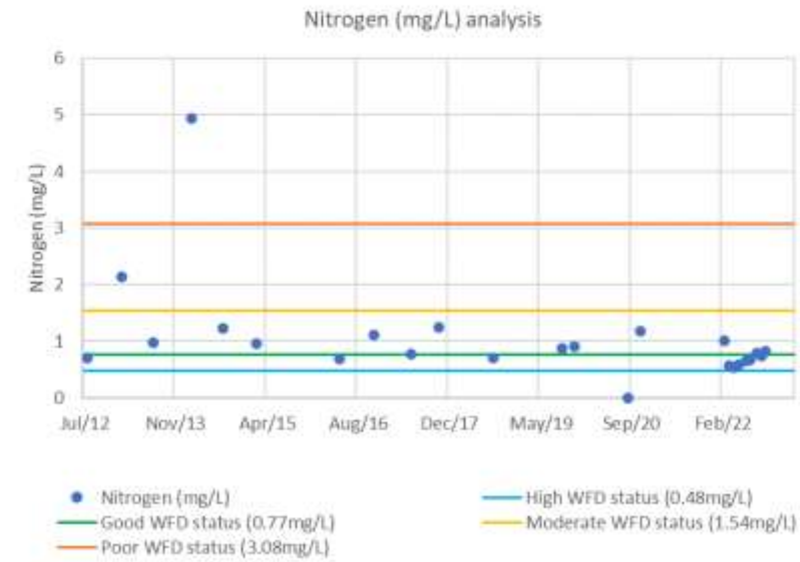


Figure 2-3: Total-N concentrations (mg/L) from 2012 to 2022 for FML sample point

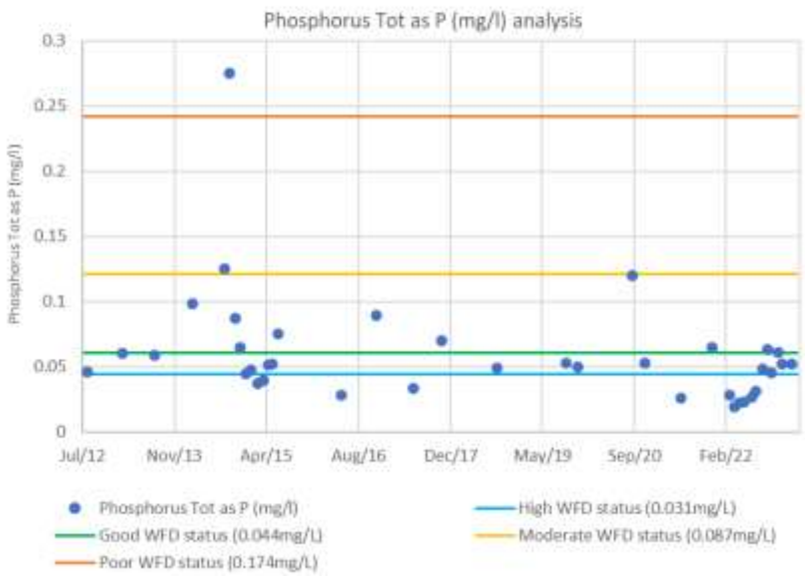


Figure 2-4: Total-P concentrations (mg/L) from 2012 to 2022 for FML sample point

Monitored biochemical oxygen demand (BOD) concentrations between 2012 to 2022 showed that all the samples were less than 4 mg/l, the upper limit for the 'high' WFD class, except during the 2014/13 flood event, which exceeded this limit (Figure 2.5). Concentrations for ammoniacal N between 2012 and 2022 were generally under 0.3 mg/L, and so would also be classed as 'High' status (Figure 2.6). During this period two samples did exceed this, but were still less than 0.6 mg\l and were equivalent to 'Good' status. Measurements for pH indicated a significant variability with readings ranging from 7.1 up to 8.7 over the 10 year period (Figure 2.7).

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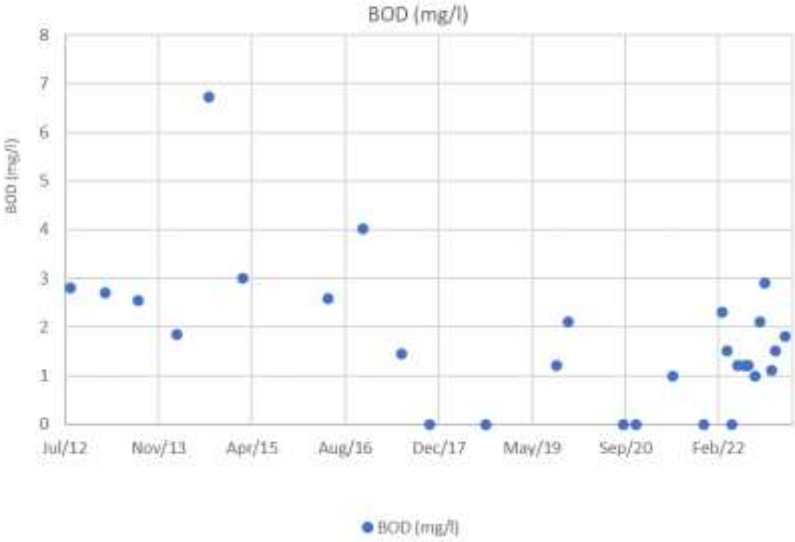

Figure 2-5: BOD concentrations (mg/L) from 2012 to 2022 for FML sample point

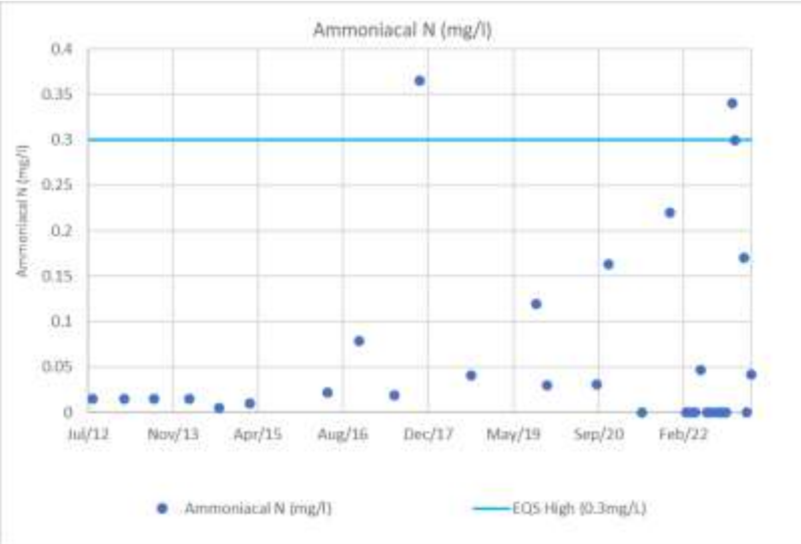

Figure 2-6: Ammonical N concentrations (mg/L) from 2012 to 2022 for FML sample point

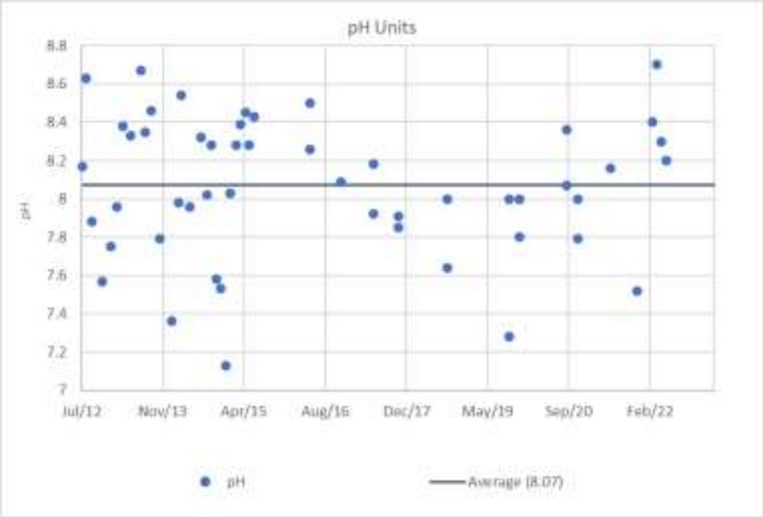

Figure 2-7: pH (units) from 2012 to 2022 for FML sample point

Overall, water quality monitoring of FML indicates that being a predominately groundwater fed lake, with seasonal inundation from the River Thames, the water body has good (would be classed as Good or High for most WFD parameters if it was a WFD water body), fairly stable physico-chemical conditions. Water quality was only significantly influenced during the 2013/14 flooding when it experienced substantial inputs from the River Thames.

2.2.2 Specific pollutants and priority substances

A review of specific pollutants and priority substances (WFD chemical status parameters) indicated that most were found to be compliant with "Good" status under the WFD for the FML (see Appendix A of this report). Although several were at or below the LoD due to the laboratory LoD being greater than the relevant EQS (e.g. Benzo(a)pyrene and Dichlorvos (Priority)). When compared against the 2019 and 2022 classifications for the River Thames WFD water body, Perfluorooctane sulphonate (PFOS) and Polybrominated diphenyl ethers (PBDE) were noted as failing in the Thames but as Good at FML. All specific pollutants that could be assessed were noted as High status in both the River Thames and within FML.

2.2.3 Groundwater water quality

Groundwater monitoring of boreholes near to FML was undertaken for RTS. These found that FML has a good hydraulic connection with the gravel aquifer. However, the current water quality of the lake may be being influenced by the ingress of groundwater flows of poorer quality water from the nearby landfills. The validity of this statement is currently being evaluated as part of a hydrogeological risk assessment.

2.2.4 Other water quality indicators

The benthic invertebrate species present in FML indicate that the water body is enriched and heavily sedimented (APEM, 2023).

2.3 Microbial water quality

Due to a number of lakes being used for recreational purposes, bathing water season microbial monitoring has been undertaken for four years, since 2019. Monitoring outside the bathing water season was also conducted between March and April 2023 and October 2023 and February 2024.

Microbiological parameters and standards are set out in the Bathing Waters Regulations 2013. Specifically, for *Esherichia coli* and *Intestinal enterococci*, which collectively can be referred to as faecal indicator organisms (FIOs). These bacteria come from sources such as sewage, agricultural livestock and wildlife (e.g. birds). During the bathing season (May to September) each designated bathing water is sampled weekly for the bacteria. The waters are then classified based on up to four years' worth of data against criteria noted in Table 4.1.

Table 4.1: Inland Bathing Water standards

Status	Parameter
Excellent	EC: ≤500 cfu/100ml ; IE: ≤200 cfu/100ml (95th percentile)
Good	EC: ≤1000 cfu/100ml ; IE: ≤400 cfu/100ml (95th percentile)
Sufficient	EC: ≤900 cfu/100ml ; IE: ≤330 cfu/100ml (90th percentile)
Poor	means that the values are worse than the sufficient

Microbial monitoring was undertaken in FML and on the River Thames, upstream of the Spelthorne Channel intake (Figure 2-8 and Figure 2-9). Based on the Bathing Water Standards (i.e. using the bathing water season data only), the River Thames (upstream of the Spelthorne Channel intake) would be classed as 'Poor' whereas the FML (referred to as 'Ferry Lane' in the figures), and other lakes to become part of the Spelthorne Channel, would be classed as 'Excellent'.

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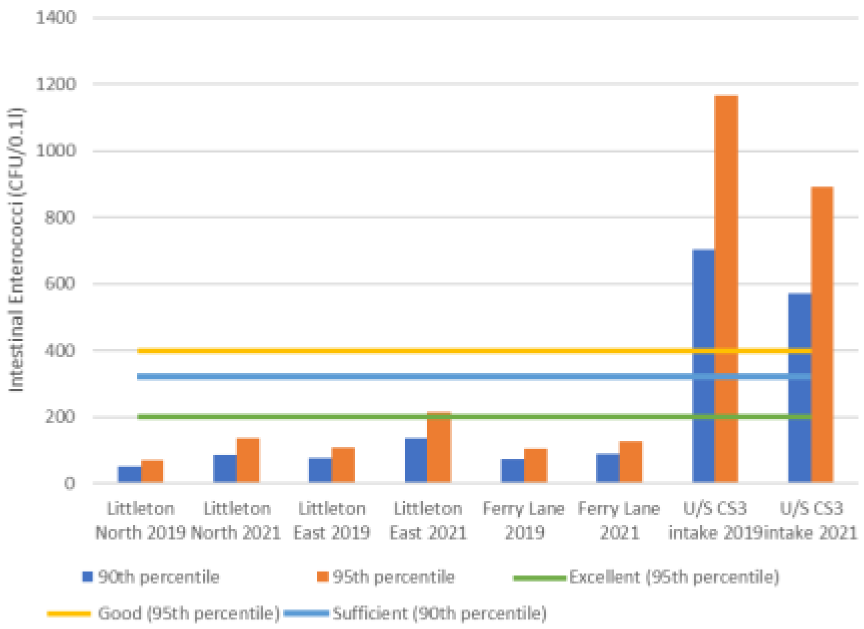

Figure 2-8: Intestinal Enterococci counts for locations within the RTS study area during the 2019 and 2021bathing water season

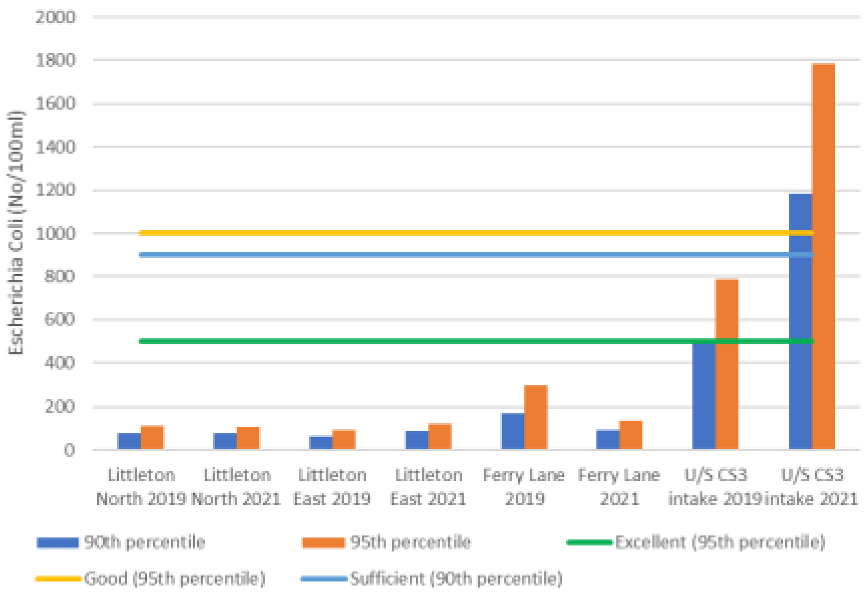

Figure 2-9: Escherichia coli counts for locations within the RTS study area for 2019 and 2021 bathing water season (note, Good and Excellent classifications are based on 95th percentiles of data, compared to Sufficient which is only based on the 90th percentile).

Clostridium perfringens are not included in the Bathing Water standards, and are widely distributed in the environment and foods, and forms part of the normal gut flora in people and animals (Clostridium perfringens – GOV.UK (www.gov.uk)). However, it can be used as indicator of faecal contamination due to its sources (DWI). The spores from clostridium perfringens are unlikely to present a problem when consumed directly from contaminated water in low levels, but can cause issues through the incorrect preparation, storing or cooking of foods.

Samples of Clostridium were taken during 2022 in FML and upstream of the proposed Spelthorne Channel intake. The samples indicated that FML consistently has levels below those seen in the River Thames (Figure 2-10).

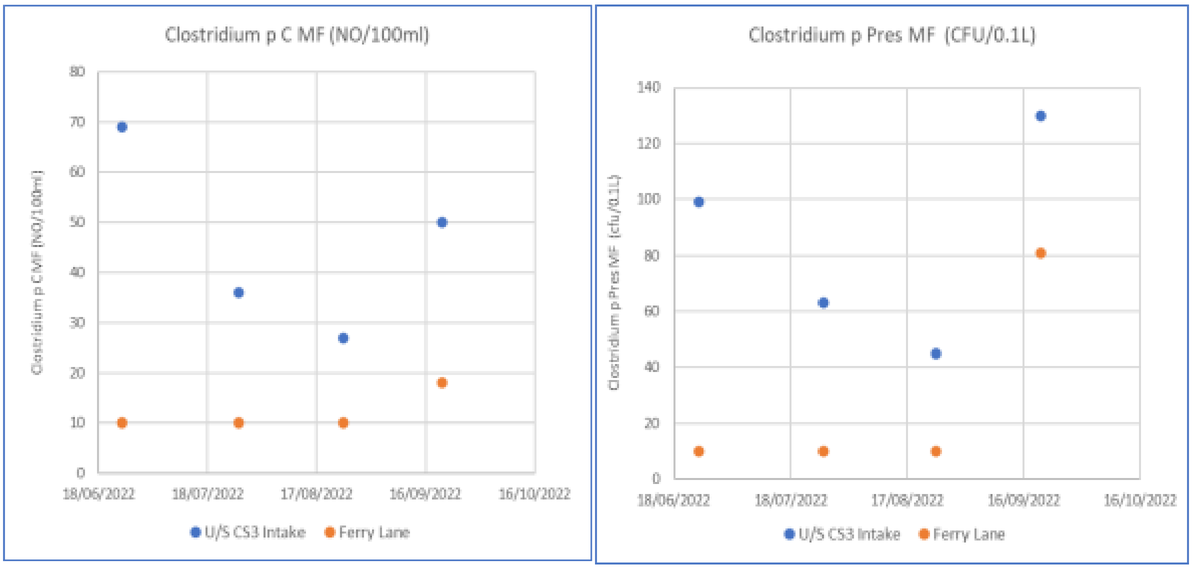

Figure 2-10: Clostridium perfringens counts for two locations within the RTS for 2022

3. Post-RTS Modelling Results

The Integrated Modelling Report (DHI/Stantec, 2023) describes and evaluates the effects of constructing two new RTS channel sections on hydrology and water quality. This modelling exercise was scoped and undertaken prior to the FML Options Appraisal and therefore all outputs are based on 'Option 1', with Spelthorne Channel passing through FML. A modified version of the MIKE SHE-MHR flow and transport model was used to analyse the dry year (2016/2017) and the wet year (2009/2010), which includes a 20-year flood event with RTS in place. To assess the impact of the RTS regime model, the results of the scenario model, called Scenario D, were compared with the baseline regarding groundwater levels, lake water balances, lake/channel residence times and water quality. The analysis included ten model runs, including calibration/validation runs. An additional sensitivity run, called the "flushing scenario" was conducted to assess sediment transport, accounting for sediment discharge following flood peaks.

For the dry year model runs an augmented flow of 0.5 m^3/s was incorporated in the model and therefore the lake would mainly be influenced by this flow and not flood flows from RTS. The wet year includes a one in twenty year flood through the lake with RTS in operation and when not flooding, an augmented flow of 1.0 m^3/s.

3.1 Water availability

3.1.1 Lake levels

As with the baseline scenario, the Integrated Modelling Report (DHI/Stantec, 2023) modelled the lake water balance for scenario D during both dry (2016/2017) and wet (2009/2010) years, as indicated by Figure 3.1 and Figure 3.2, respectively.

When comparing the baseline (shown in Figure 2.2) to the scenario D operational phase of RTS (Figure 3.1) in a dry year, it was found that the water balance in the FML would increase from 0.3 million m^3/year to 16.1 million m^3/year. This represents a very significant change, which is also seen in the nature of the water balance which showed a move from being a groundwater fed lake in the baseline to a river fed lake in scenario D. In addition to the change in source, the residence time was also shown to be significantly reduced from 299 days to 8 days.

In the case of the wet year, the water balance in FML is predicted to increase from 4.3 million m^3/year in the baseline to 184.5 million m^3/year in scenario D. This also indicated a very significant change and based on the model the source would change from overland flow in the baseline to river flow in scenario D. Although it should be noted that in scenario D the flood waters would still be coming from the River Thames originally. As with a dry year, residence times would also decrease, in this case from 25 days to 18 hours with RTS in place.

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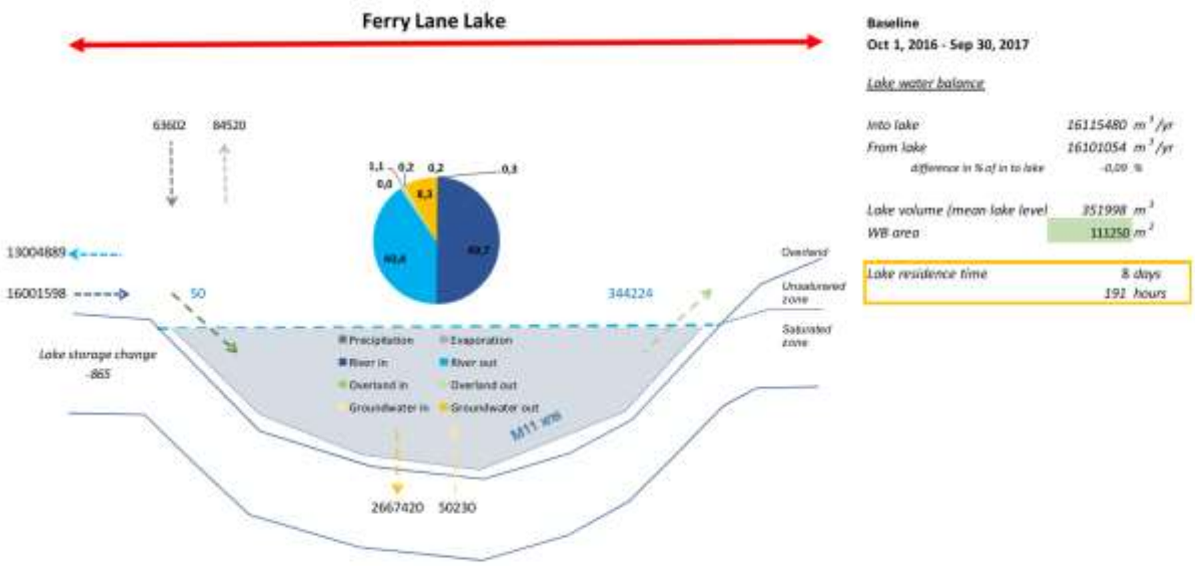

Figure 3-1: Water balance diagram for Scenario D in the dry year (2016/2017)

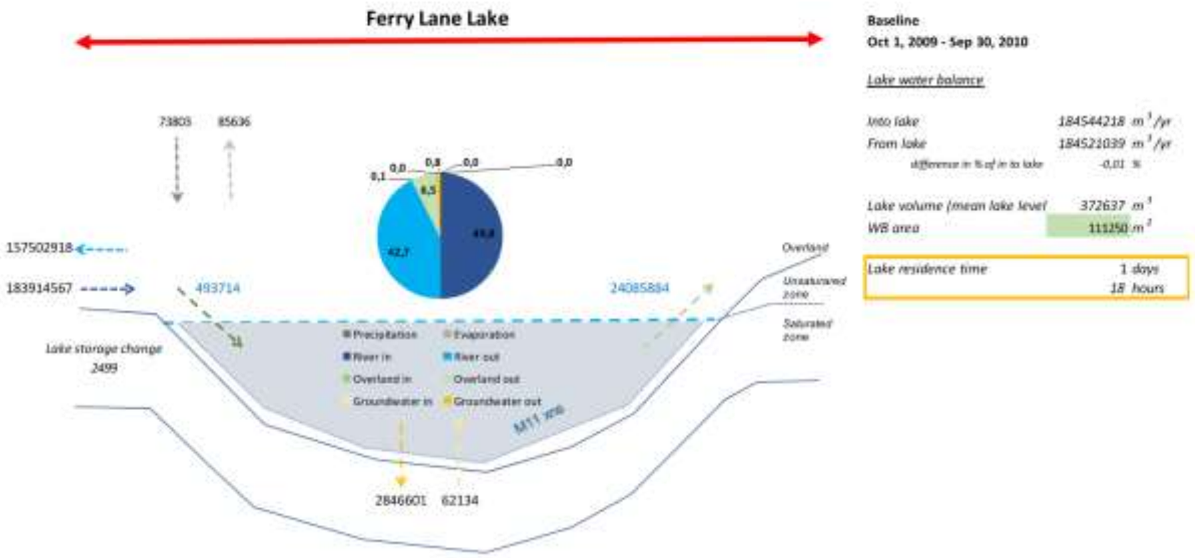

Figure 3-2: Water balance diagram for Scenario D in the wet period (2009/2010)

The UK Centre for Ecology and Hydrology also conducted water quality modelling in 2023, which confirmed the prediction of a significant decrease in residence time in FML after implementing the RTS. The modelling indicates that the FML is expected to behave more like a river, with anticipated residence times of 2 and 1 days. The data used for this modelling was collected in 2013 and 2019 and therefore just these two years were evaluated (in contrast to DHI/Stantec which used different years).

3.1.2 Groundwater

According to the Integrated Modelling Report (DHI/Stantec, 2023), FML will be one of the sites most affected by changes in groundwater flow during a dry year. The model indicates that FML will change from a predominately groundwater dependent lake, to losing water to ground as it will receive most of its water from the Spelthorne Channel.

3.2 Water quality

3.2.1 Nitrogen and Phosphorous

The integrated Model (DHI\Stantec, 2023) was used to assess the potential average concentrations of Total-N and Total-P for Scenario D, based on a dry year and a wet year. Figure 3.3 and Figure 3.4 illustrate the Total-N concentrations for the baseline and Scenario D in the dry and wet year, respectively. In the baseline simulation (i.e. pre RTS), the concentration of Total-N remains around 2.5 mg/L in the dry year and peaks to almost 8mg/l during the high flow event in the wet year. During Scenario D, the concentration of Total-N concentrations are 7-9 mg/L during the dry year and 6-8 mg/L during the wet year. This indicated the potential for a substantial increase during dry periods but a similar situation in wet periods. This is because FML already receives nutrient rich water from the River Thames during high flows, so is conditions are expected to be the same or similar when the RTS is in operation during flood conditions. Whereas, in a dry year Scenario D would lead to the continuous input of riverine water when the lake does not currently receive any.

In the dry year, if the WFD classification is applied to the lake (it is important to note that this application is just for illustrative purposes and therefore has no legislative basis, as the lake is not classified as a WFD water body), Total-N concentrations in the baseline would be classified as ‘poor’ throughout the analysis period. Whereas, they would be classed as ‘bad’ during the majority of the wet year. For Scenario D the model predictions indicate that nitrogen concentrations would be classed as ‘bad’ in both dry and wet years, once RTS was in operation.

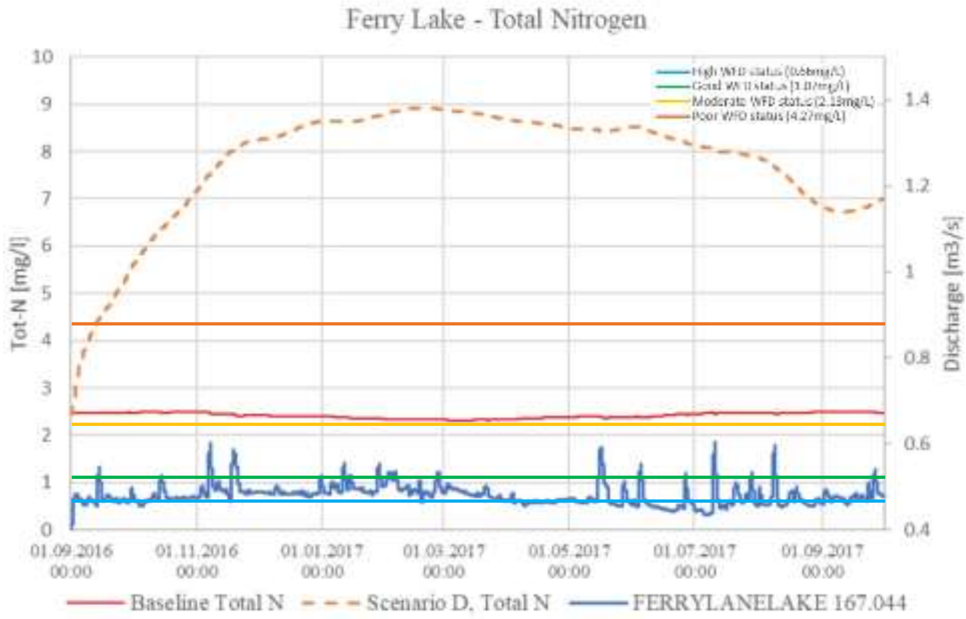

Figure 3-3: Total-N concentrations (mg/L) in the dry year (2016/2017) in FML

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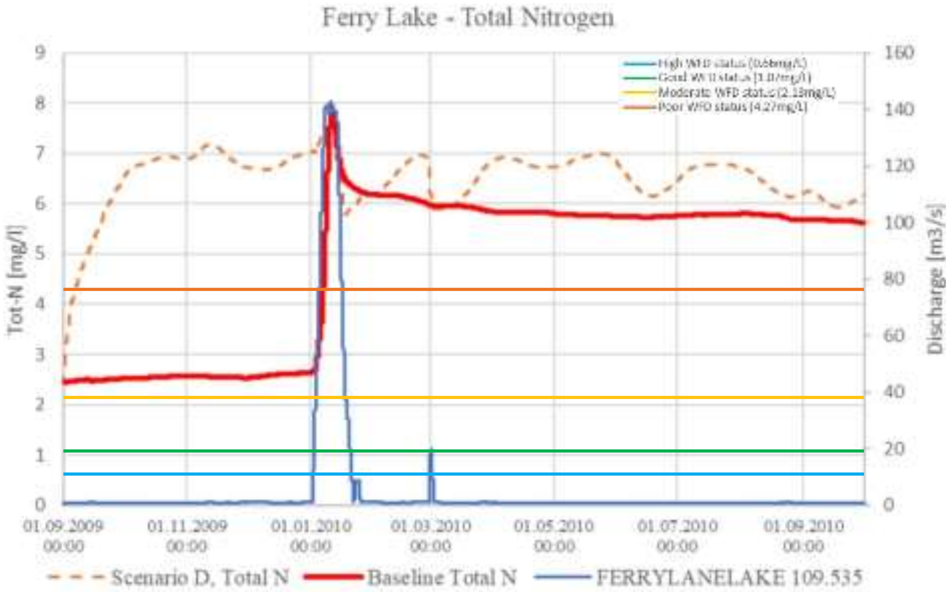

Figure 3-4: Total-N concentrations (mg/L) in the wet year (2009/2010) in FML

Figure 3.5 and Figure 3.6 illustrate the Total-P model results for FML, which indicate a similar pattern to that seen with Total-N. In the baseline (i.e. pre-RTS), concentrations are steady at around 0.05 mg\l in a dry year and range between 0.2 and 0.3 mg\l for most of the wet year. In the modelled Scenario D this changes to 0.15-0.25 mg\l in the dry year and 0.13-0.35 mg\l for a wet year. The greater variability in a wet year compared to the baseline is indicative of greater dilution.

Under WFD the baseline concentrations would be classed as “good” in a dry year and “bad”\”poor” in the wet year. Under Scenario D, the classifications would change to “poor” in a dry year but stay at “bad”\”poor” in a wet year, although recovering to “poor” status quicker than seen in the baseline.

Appendix F: Ferris Meadow Lake Water Quality Assessment

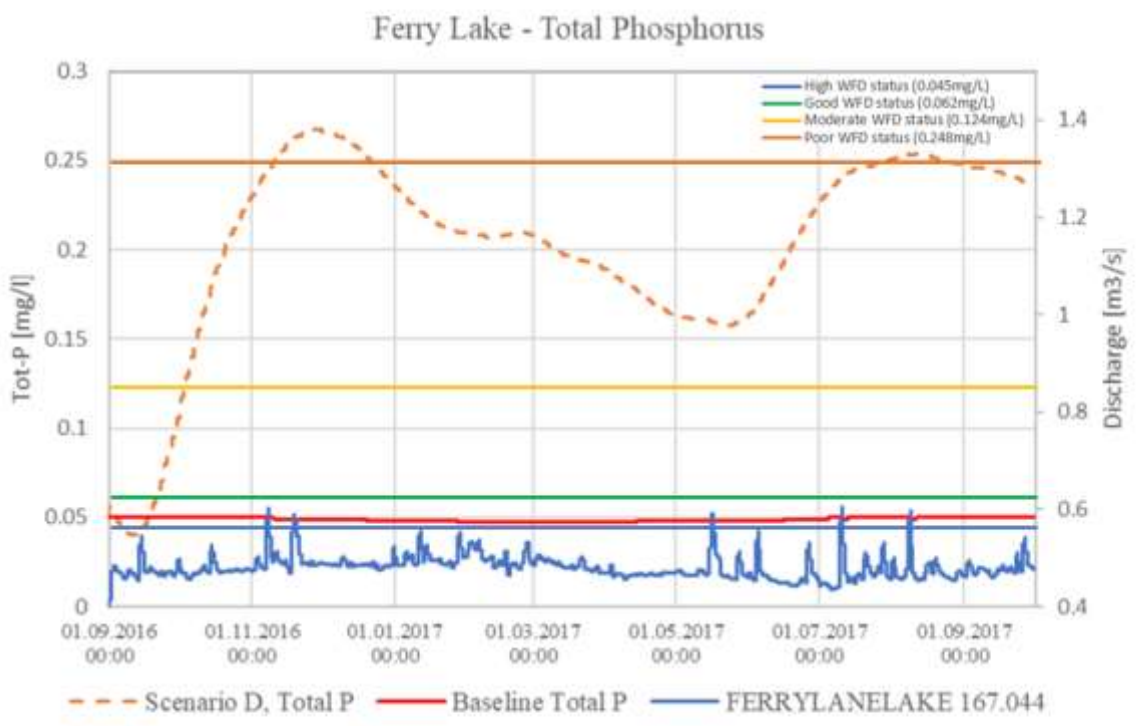

Figure 3-5: Total-P concentrations (mg/L) in the dry year (2016/2017) in FML

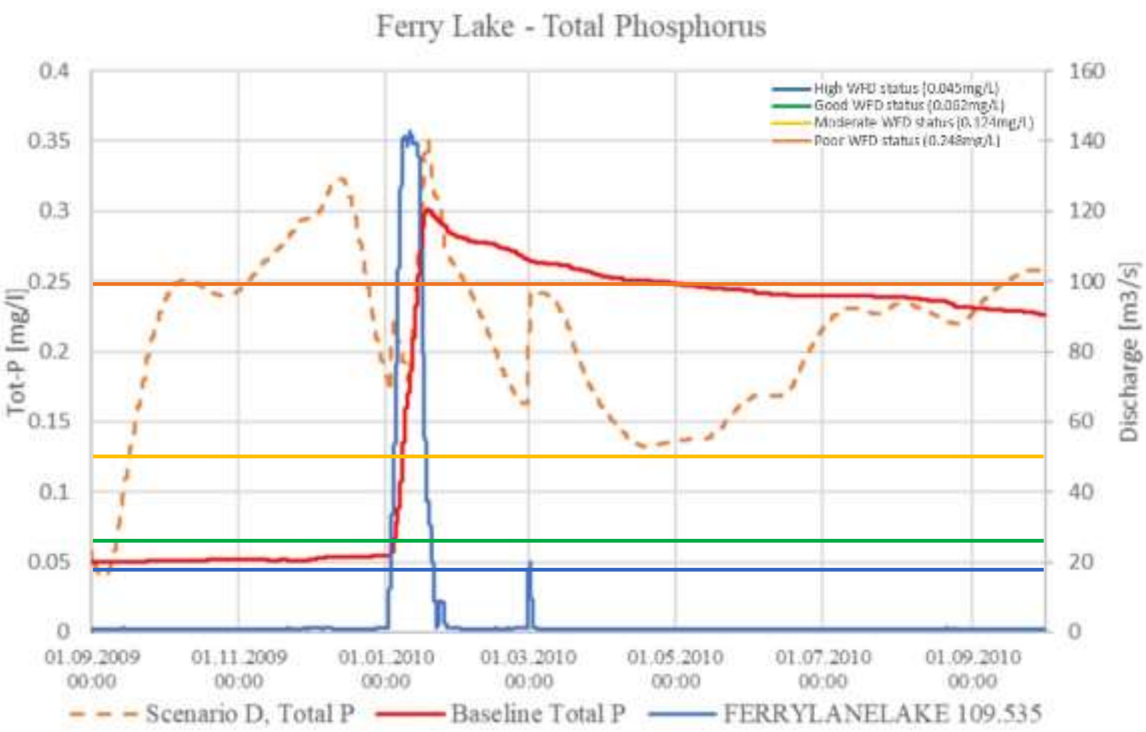

Figure 3-6: Total-P concentrations (mg/L) in the wet year (2009/2010) in FML

The Integrated Model (DHI\Stantec, 2023) also estimated the amount of sediment that may build up in the lakes following a flood event (flushing scenario). It estimates that the majority of sediment in the River Thames will not enter the RTS channels, but of that entering the Spelthorne Channel most would settle in the lakes upstream of FML. Which as the third and final lake in the Spelthorne Channel, is expected to receive one of the lowest inputs of coarse silt deposits.

Although the majority of sediment in the Spelthorne Channel will drop out of suspension upstream of FML, some will be deposited in FML (approximately 10% of the sediment deposited in the Spelthorne Channel lakes). With this, sediment-bound P will accumulate, specifically, an increase in phosphorus fractions is expected during flood events, several studies on sediment-bound P have shown that, on average, the “P available to algae” is only 5 to 15 percent of the total P found in the sediments. Moreover, the heavy sedimentation during 20-year flood events will bury the existing sediment with a layer of new sediment, altering the future regime of sediment-water exchange of various P fractions (DHI\Stantec, 2023), limiting the effect sediment-bound P is likely to have on FML with the RTS in operation.

3.2.2 Phytoplankton growth

In general, longer in lake residence times in combination with increases in the nutrients conditions have the potential to cause excessive phytoplankton growth, algal blooms and potentially result in eutrophication of the lake. Furthermore, there is a risk of cyanobacteria blooms (blue-green algae) which have the potential to release toxins which harm human health. As noted in the sections above, the RTS will significantly reduce residence times during flood and augmented flow conditions and permanently increase nutrient concentrations.

Previous work has stated that phytoplankton growth is affected by the residence time of water (Schellenberg & Burns 1997, Melbourne Water, 2005 and Acreman *et al.,* 2006). Additionally it has been noted that rivers with longer residence times are more likely to record algal blooms than those with shorter ones (in water bodies with high nutrient concentrations) (Bowes et al., 2012). Acreman *et al.,* 2006 found that a 20 day threshold exists below which phytoplankton communities are affected by ‘washout’, with the other studies stating that when the residence time is less than 30 days, the risk of algal proliferation is low. Therefore, with the increased nutrient concentrations, the substantial reduction in residence times (with an augmented flow of 0.5m^3/s) will likely manage the risk algal blooms in FML developing. Additionally, as phosphorus discharges from upstream wastewater treatment plants are anticipated to decrease, phosphorus concentration in the River Thames will gradually reduce, reducing the concentration (Bowes *et al.,* 2012) in the Spelthorne Channel.

The UKCEH QUESTOR and Protech Model was used to analyse the water quality impacts before and after the RTS during augmented flow scenarios (UKCEH, 2023). CEH tested a number of augmented flow scenarios using baseline periods of 1 April to 31 October 2013 and 1 April to 31 October 2019, allowing evaluation of how water quality responds during the growing season. For the purposes of this options appraisal, results for the 0.5m^3/s continuous augmented flow scenario have been used as the modelling results indicate that this presents a worst-case scenario for water quality in the flood channel i.e. less of a so-called ‘sweetening’ flow to ensure the poorer quality water in the River Thames does not spend too much time in the connected lakes[1].

Using the QUESTOR and PROTECH models chlorophyll-a concentrations (an indicator of phytoplankton biomass) were modelled for the 2013 and 2019 scenarios noted above. The modelling indicated that algal blooms did occur in the lakes in the summer months, with an augmented flow, however chlorophyll-a (and nutrients) were lower in the final stages of the Spelthorne Channel (i.e. FML) than at the intakes, which could be a consequence of phytoplankton settling potentially outweighing the effect of primary production.

Figure 3.7 displays the chlorophyll-a concentrations (μg/L) observed in the samples collected between 2012 and 2022, along with the estimated average concentration from the model (with a 0.5 m^3/s augmented flow) between 18.9 and 21.7 μg/L. The figure shows that for the majority of the time, existing conditions are below the modelled averages, although there are periods where historic concentrations of chlorophyll-a exceed the modelled averages, particularly after the 2013/14 floods when nutrients into FML were known to be high.

The duration or prevalence of exceedance of widely accepted environmental- and legislatively-relevant thresholds can be used as indicators of concerning conditions. In this respect, 30 μg/L chlorophyll-a is a threshold between mesotrophic and eutrophic flowing fresh waters in temperate regions (Hutchins et al., 2010). The modelling therefore suggests that although chlorophyll-a concentrations will, on average in the growing season, be higher than existing conditions, they will unlikely reach the threshold between mesotrophic and eutrophic conditions.

[1] It should be noted that for the PEIR (and the supporting WFD preliminary assessment) reported as part of the Statutory Consultation process a continuous augmented flow of up to 1.0 m^3/s was used as a threshold for the maximum augmented flow which represents a worst case scenario, with the evidence available at the time, for the River Thames. Potential impacts of continuous 0.5 and up to 1.0 m^3/s augmented flows were considered as part of the PEIR assessment in relation to the lakes and channels.

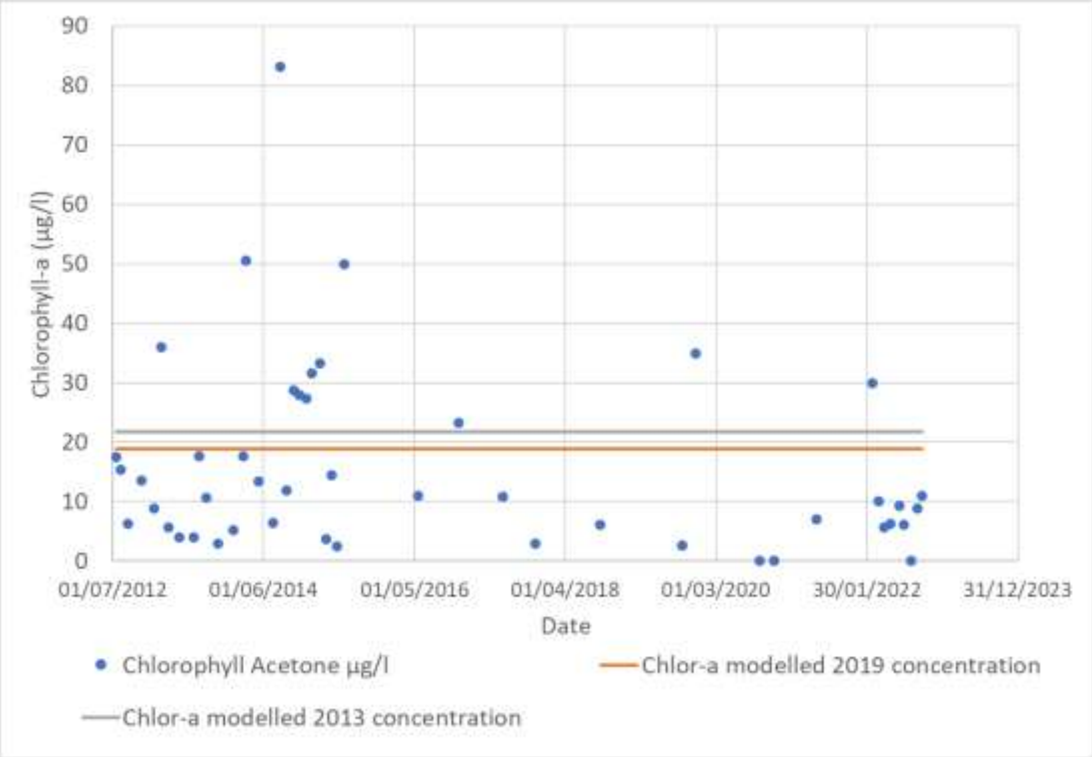

Figure 3-7: Chlorophyll Acetone concentrations (µg/L) from 2012 to 2022 and modelled average concentrations during augmented flow conditions

3.2.3 Contaminants

As indicated in the PEIR, the RTS will be constructed through an historic landfill and as such there is a potential for contaminants being mobilised in the groundwater or getting into the channel and therefore to downstream receptors such as FML.

The following environmental quality standards (EQSs) exceedances exist in the WFD GW water bodies associated with the RTS:

- Chobham Bagshot beds: cadmium, lead, nickel, copper and arsenic
- Lower Thames Gravels: cadmium, lead, mercury, nickel, naphthalene, arsenic, chromium, and copper.

There could therefore be potential construction and operation effects from the mobilisation and disturbance of contaminants.

Given the increased connectivity of FML to upstream sources of water, there would be the potential for FML to receive water with higher concentrations of pollutants than are currently within the lake water column (data on lake sediments collected as part of the ground investigations study data is currently being reviewed as part of the hydrogeological risk assessment).

Assessments are ongoing into the level of risk and specifically which contaminants may pose a risk, but, without mitigation, there is potential for new or increased concentrations of contaminants to enter Ferris Meadow Lake as a consequence of RTS due to:

- Increased connectivity to the River Thames and wider catchment;
- Mobilisation of contaminants from previously disconnected lakes further upstream in the Spelthorne Channel; and
- Changes in groundwater pathways.

However, with mitigation options in place, the risk of further contamination of the lake will be significantly reduced. Such mitigation could include double lining of the sheet piling areas to ensure that any potential leachate from the landfills could not enter the channel. Adaptation of the augmented flow on a seasonal basis also provides a means of mitigating the increased connectivity with the River Thames.

3.3 Microbial water quality

As noted in Section 1, although FML is not a designated Bathing Water it is used for swimming and other water-based activities and the landowner has applied for FML to be designated as a Bathing Water. As such, to take a precautionary approach to the water quality assessments and, in light of the potential for FML to be designated in the future, the potential impacts on the FML were undertaken using the microbiological parameters and standards set out for Bathing Waters.

Although there are several sources of FIOs into rivers, they do not persist, except for clostridium spores, and as noted in Perkins *et al*., 2016, the inactivation of FIOs (e.g. the point at which they are unlikely to impact on human health) is very complex and factors such as the source and the hydrodynamics of the environment in question will effect the FIOs. Beyond these, other factors that impact on FIOs include:

- Rainfall – this can affect levels in bathing waters through runoff from agricultural land, creating sewage spills or decreasing residence time in the bathing waters themselves.
- Wind – can lead to disturbance of contaminated sediments mixing into the water column.
- Sunlight – ultraviolet rays kill FIOs.
- Seasonality – factors such as day length, water temperature, number of bathers in the water can all impact on the numbers of FIOs.

The FML is currently an offline lake and only receives significant volumes of surface water during flood events. Due to its location downstream of the River Thames' confluence with the Wey, it likely receives FIO's from the Wey and Chertsey Bourne catchment.

The Spelthorne Channel will cut through other lakes (e.g. Littleton N & E) and some fields before reaching the FML. There are no significant numbers of livestock located 'upstream' of the FML in the areas where the new channel will go and no registered sewage discharges or CSOs, with the closest significant point source of FIOs, on the River Thames, being approximately 12 km upstream of the proposed Spelthorne Channel intake (with the RTS in place, FML will no longer receive FIO's from the Wey and Chertsey Bourne in most flood scenarios as the Spelthorne Channel intake is upstream of the confluence).

As presented in Section 2.3, based on the Bathing Water Standards, at the proposed inlet to the Spelthorne Channel, the Thames would be classed as ‘Poor’ whereas the FML would be classed as ‘Excellent’. Therefore, there is a risk of deterioration if the FML is included in the Spelthorne Channel.

As such an assessment has been undertaken looking at the potential sources of FIOs against the modelled time of travel down the new channel and decay of FIOs to identify what, if any, risks to Bathing Water standards could exist to FML. As the majority of scientific research into FIOs and the persistence in the environment is based on coastal bathing waters, the assessment in this report takes a conservative approach to identifying potential risks. The assessment is based on:

- The Spelthorne Channel creating a pathway into FML during all flow conditions;
- An input of FIOs being at the inlet to Spelthorne (no assumptions are included for sources into the channel itself);
- Peer reviewed literature on the decay rate of FIOs;
- Previous modelling on time of travel down the Spelthorne Channel;
- Implications from seasonality of FIOs discharges;
- Other considerations such as wind and rainfall are not consider in detail but are noted where appropriate.

Decay rates of FIOs vary depending on factors such as turbidity, salinity and exposure to sunlight. Most research is based on coastal environments due to the majority of bathing waters being located there. Experiments undertaken by the Environment Agency (2007), looking at enterococci mortality in for estuarine and marine conditions, produced a range of enterococci T90 values (the amount of time for 90% of viable cells to die) for irradiated conditions (between 3.7 hours and 113.9 hours) and in the dark (between 8.8 hours and infinity). Based on research and accounting for light and dark conditions UKWIR has set a conservative T90 estimate of 72hrs for coastal environments (UKWIR, 2007). Although looking at decay rates, rather than specifically setting a T90, studies covering freshwater environments indicated a different scale of decay with enterococcal species becoming unculturable with 19-53 days (around 20 days for *Enterococcus faecalis* the main species of interest, Lleò *et al.,* 2005). Other studies have indicated a potential 97% reduction in concentrations by day 5 (Perkins *et al.,* 2016). For the purpose of this assessment the value of 20 days was used as a conservative value although the longer 53-day potential was also considered.

As noted above and shown in Section 2.3, the River Thames at the inlet for the Spelthorne Channel would be classed as Poor with FIO counts of 571 for Intestinal Enterococci (90th percentile) and 1185 for Eschericia coli (90th percentile) whilst all other locations in the channel alignment would be classed as Good or Excellent indicating minimal or no sources of contamination.

The Integrated Model (DHI/Stantec, 2023) calculated residence times for each channel section and lake (see Section 3.1), enabling the time of travel to be inferred. The predicted average time of travel, for anything travelling from the channel intake to FML is 45 days during dry years (i.e. just the augmented flow of 0.5m^3/s) and 6 days during wet years (a year with a 1 in 20 year flood and a 1.0 m^3/s augmented flow. As such, by applying the 20 day decay rate, this in indicates that during dry years FIOs are unlikely to reach FML through the Spelthorne Channel from the River Thames in a viable state or numbers to cause a risk to human health and would be expected to support a classification of at least Good at the FML. There is the potential for FIOs to enter the FML during wet years. However, as during these years there is the potential for the River Thames to enter the FML directly during flood events this is expected and in line with the current situation.

If a T90 of 53 days was considered, although some FIOs could make it to the FML, based on the counts noted at the proposed Spelthorne Channel intake, based on expected decay rates and a worst case scenario of turbid waters, the number of FIOs reaching FML would be expected to be compliant with at least Good under the Bathing Water standards, assuming no other inputs and a steady decay rate.

As noted earlier, Clostridium can be used as an indicator of faecal contamination (although not a Bathing Water Standard indicator). As such samples were taken during 2022 in FML and upstream of the proposed Spelthorne Channel intake. The samples indicated that FML consistently has levels below those observed upstream of the proposed intake section of the Thames (Figure 2-10). Based on this data and the potential for Clostridium spores to persist in the environment, there is a chance for microbial levels to increase in FML as a result of the augmented flow through operation of the Spelthorne Channel but overall the risks to bathing water quality from Clostridium will be unaffected over and above as previously described.

4. Options

As the current design of the RTS has raised concerns primarily about its impact on water quality in lakes that are currently not connected, such as FML, the nine alignment options have been appraised (see FML, Options Appraisal Section 2 and Appendix A for Option sketches).

Table 4.1 shows the potential negative and positive effects of each option developed on the water quality of the FML, as well as a risk assessment based on: (i) high risk if the option has the potential for high significance environmental impact and difficulty in achieving acceptable mitigation; (ii) medium risk if the option has potential for a medium significance environmental impact and requires bespoke mitigation; and (iii) low risk if the option has potential for a minor or positive environmental impact and mitigation is likely to be achieved through standard practice.

Table 4.1: Water quality effects for each alternative option for FML

Option	RAG Status	Justification
Option 1	Medium	Mixing of water from the River Thames due to the presence of the augmented flow (in non-flood conditions and therefore mainly in the summer months) is not anticipated to introduce Faecal Indicator organisms (FIOs or bacteria) in a viable state or in numbers that would cause a risk to human health and would be expected to support a classification of at least a Good Bathing Water status at the Ferris Meadow Lake. Mixing river water with lake water is anticipated to increase nutrient conditions, and other contaminants in the lake. However, effects of increased nutrients and the consequent risk of algal blooms occurring over and above existing levels will be mitigated against by having a continuous augmented flow into the lake reducing the residence times in the lake (shorter residence times are known to help prevent algal blooms). In the case of contamination, risks will be significantly reduced through mitigation. In terms of flood flows, FML is currently subjected to periodic inundation from the River Thames and, with RTS in place will be receiving flood flows from the River Thames on a similar frequency to existing conditions, which will include the input of nutrients, microbes, and pollutants.

Appendix F: Ferris Meadow Lake Water Quality Assessment

Option	RAG Status	Justification
Option 2	Low	No direct connection to FML. The Chap is already directly connected with the River Thames, therefore impact magnitude would be reduced. Permanent changes to the Chap water quality and hydromorphology would occur due to the existence of the flood channel route in its footprint, the augmented flow and increased flood flows.
Option 3	Low	During construction, the realignment of the lake edge may result in a small decline in water quality but would not be affected during operation.
Option 4	Low	During construction, the works within the Chap may result in a small decline in water quality due to the mobilisation of sediment. Although there is currently no water quality monitoring data or modelling outputs for the Chap, it is anticipated that conditions are similar to the River Thames at Desborough. This option is unlikely to change the water quality of the Chap as it will continue to receive water from the River Thames and remain a backwater to the Thames for the majority of the time.
Option 5	Low	No direct effects on FML. The Chap will receive the Augmented Flow. Although there is currently no water quality monitoring data or modelling outputs for the Chap, it is anticipated that conditions are similar to the River Thames at Desborough. This option is unlikely to change the water quality of the Chap, as it will receive the augmented flow. It will continue to receive water from the River Thames and remain a backwater to the Thames for the majority of the time.

Option 6a	Medium	In terms of flood flows, FML is currently subjected to periodic inundation from the River Thames and, with RTS in place will be receiving flood flows from the River Thames on a similar frequency to existing conditions, which will include the input of nutrients, microbes, and pollutants. As the augmented flow will mainly pass through The Chap (noting that there will be no additional control structure to fully prevent some of the augmented flow entering FML) in comparison to Option 1, flow and circulation through Ferris Meadow Lake will be less, increasing the residence time of the lake and enabling sediments and nutrients to settle in the lake, between flood events. There is a risk that the increased residence time and continual input of nutrients will increase the risk of eutrophication in the lake. Overall the level of risk to FL will be similar to Option 1 (whilst the exact magnitude of any difference cannot be calculated between Option 1 and 6a, Option 1 has a shorter residence time and increased nutrient loading and Option 6a has a longer residence time and lower nutrient loading). As FML is not entirely isolated from the augmented flow, this option would provide a permanent connection to sources of microbial organisms, however it is anticipated that due to the length of time it is predicted that water will pass through the flood channel and lakes (under average dry year conditions), most FIOs will decay before reaching Ferris Meadow Lake, reducing the scale of impact on the Bathing Water Standard criteria. Although there is currently no water quality monitoring data or modelling outputs for the Chap, it is anticipated that conditions are similar to the River Thames at Desborough. This option is unlikely to change the water quality of the Chap, as it will receive the augmented flow. It will continue to receive water from the River Thames and remain a backwater to the Thames for the majority of the time. However, as the augmented flow will pass through the Chap, flow and circulation through FML will be less, increasing the residence time of the lake and enabling sediments and nutrients to settle in the lake, between flood events. There is therefore a risk that the increased residence time and continual input of nutrients, will increase the risk of eutrophication in the lake.

Option	RAG Status	Justification
		This option would provide a permanent connection to sources of microbial organisms, however it is anticipated that due to the length of time it is predicted that water will pass through the flood channel and lakes, most FIOs will decay before reaching FML, reducing the scale of impact on the Bathing Water Standard criteria.
Option 6b	Low	FML will receive flood flows from the River Thames on a similar frequency to existing conditions, which will include the input of nutrients, microbes, and pollutants. Residence times in FML are likely to be similar to existing conditions in non-flood conditions, as it will be separated from the augmented flow, but will be likely lower during flood events. Water quality in FML will potentially slightly improve due to the reduced sources of pollutants in flood conditions and reduced mixing of water during non-flood conditions. Although there is currently no water quality monitoring data or modelling outputs for the Creek, it is anticipated that conditions are similar to the River Thames at Desborough. This option is unlikely to change the water quality of the Creek, as it will receive the augmented flow. It will continue to receive water from the River Thames and remain a backwater to the Thames for the majority of the time.
Option 7	Low	Under this option the eastern side of FML will effectively become a separate water body to the western side which will receive augmented flow and flood flows (and will therefore be impacted to the same extent as in Option 1). The impacts on the eastern side will therefore be low, with no change to the frequency or water quality of inputs into the lake from the River Thames, when compared to current conditions.

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Option	RAG Status	Justification
Option 8	High	This option would result in FML being directly connected to the River Thames at the outfall. Water quality in the lake would likely deteriorate to be similar to the River Thames at Desborough. Boat usage of the lake will also potentially introduce new pollutants to the lake. No water quality impact on the Creek would result from this option.

5. Summary and conclusions

5.1 Water balance

The Integrated Model created for the RTS (i.e. with FML alternative option 1) indicates that with the implementation of the flood channels there will be significant change to the water balance of FML with it changing from groundwater fed to being a surface water fed system. This will significantly affect residence times, decreasing them from approximately 299 days to 8 days in dry years and 25 days to 18 hours in wet years.

5.2 Water quality

Water quality assessments have indicated that Total-N and Total-P in FML could increase during dry years (when the lake is fed by the augmented flow (0.5 m^3/s) without flood flows) as RTS with Option 1 becomes operational, but no significant change would be expected in wet years due to mixing with the River Thames during flood conditions. If the WFD standards are applied to the lake (noting that it is not a WFD water body), nitrogen concentrations would remain at “bad” status in a wet year and a deterioration from “poor” to “bad” would be predicted in dry years once RTS becomes operational. In terms of phosphorous a deterioration from “good” to “poor” would be predicted in dry years but no deterioration in class would be predicted in wet years. This deterioration in dry years would be due to the augmented flow whereas the lack of significant change in wet years would be due to flooding and inundation into the lake from the River Thames.

Although RTS is predicted to impact on Total-N and Total-P, the modelling has indicated that the residence time in FML will be greatly reduced. As such the risk of increasing algal blooms in FML is expected to be mitigated, especially during dry years and although chlorophyll-a concentrations will, on average in the growing season, be higher than existing conditions, they will unlikely reach the threshold between mesotrophic and eutrophic conditions.

5.3 Microbial

Although the FML is not currently designated as a Bathing Water it is used for open water swimming and an application has been made to have the lake designated with that status. Baseline data for the River Thames (at the Spelthorne Channel intake) and FML indicate that they would be classed as Poor and Excellent in terms of the Bathing Water standards respectively. As such there is a risk to the FML post RTS, and further investigations regarding the rate of decay have been undertaken to assess this risk.

Using a conservative approach of assuming an input of FIOs at the inlet to the Spelthorne Channel, a decay rate of 20 days for FIOs and post RTS residence time upstream of the FML of 45 days (dry year) and 1 day (wet year), the assessment indicated that, for FML with Option 1, the risk of deterioration in Bathing Water standards in dry conditions (with the augmented flow) is low. Although the residence time is much shorter in a wet year the Thames would inundate the FML, without RTS in place, in these conditions, so the risk to the FML post RTS would be the same as pre RTS.

Literature does indicate the potential for decay rates of up to 53 days for some species of FIOs, meaning that even during dry years there is the potential for FIOs to reach the FML. However, even if this decay rate were to happen the FML would still be compliant with Bathing Water standards, although it may decline from excellent to good.

Overall the risk to FML with Option 1 with respect to Bathing Water standards would not be significantly different post RTS compared to pre RTS when considering decay rates. Furthermore, as there is no large sewage discharge in proximity to the FML or close to the Spelthorne Channel intake, this conclusion is precautionary. In addition, swimming in the lake is currently limited to the summer months, therefore, users of the lake are unlikely to be affected by inputs during flood flows, when residence times are shorter, which generally occur in the winter.

5.4 Contaminants

The water quality assessments have indicated that there are upstream sources of contaminants that could impact on FML as a downstream receptor regardless of the Option selected. Sources such as leachate and associated mobilisation through groundwater still need to be investigated in detail. Initial modelling of surface water and groundwater anticipated that, without mitigation, there could be increases in concentrations of pollutants such as aluminium, arsenic, cadmium, B(b)fluoranthene, ammonia, lead, mercury, nickel, naphthalene, chromium and copper.

Assessments are ongoing to assess this risk and proposed mitigation will significantly reduce this risk .

5.5 Conclusion on water quality effects options

Due to potential risks to FML from the RTS a series of options have been assessed.

The assessment indicated that Option 8 poses the greatest potential risk to water quality due to its open connection with the River Thames (high risk), whilst options 1, 6a and 7 are considered to pose a medium risk, due to the inputs of the augmented flow into the lake. Options 2, 3, 5 and 6b are all considered to be of low risk to water quality, as FML will not receive the augmented flow in any of these options and it is not considered that options to pass water through the Chap will affect its water quality.

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Appendix A – WFD classifications

Baseline water quality monitoring data for Spelthorne Channel monitoring locations analysed against WFD standards and compared to 2019 and 2022 WFD status for the Thames Egham to Teddington WFD water body

Table A-1: Physico-Chemical Quality Elements

Determinand	WFD 2019 Status	WFD 2022 Status	Ferris Meadow Lake	Comment
Ammonia (Phys-Chem)	High	High	Moderate	Analysed against river standards
Dissolved oxygen (%)	Good	Good	High	Analysed against river standards
Phosphate (orthophosphate)	Moderate	Moderate	High	Analysed against Thames Egham to Teddington WFD standard.

Table A-2: Specific Pollutants

Determinand	WFD 2019 Status	WFD 2022 Status	Ferris Meadow Lake	Comment
Copper	High	High		Bioavailability standards not calculable due to no available Dissolved Organic Carbon data
Manganese	High	High		Bioavailability standards not calculable due to no available Dissolved Organic Carbon data
Zinc	High	High		Bioavailability standards not calculable due to no available Dissolved Organic Carbon data
Arsenic	High	High	High	

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Determinand	WFD 2019 Status	WFD 2022 Status	Ferris Meadow Lake	Comment
Chlorothalonil	High	High	High	
Diazinon	High	High	High	
Dimethoate	High	High	High	
Iron	High	High	High	
Pendimethalin	High	High	High	

Table A-3: Chemical Priority Hazardous Substances

Determinand	WFD 2019 Status	WFD 2022 Status	Ferris Meadow Lake	Comment
Benzo(a)pyrene	Good	Does not require Assessment	LOD Fail	LOD above MAC EQS standard
Benzo(b)fluoranthene	Good	Does not require Assessment	Good	
Benzo(g-h-i)perylene	Good	Does not require Assessment	LOD Fail	LOD above MAC EQS standard
Benzo(k)fluoranthene	Good	Does not require Assessment	Good	
Cadmium and Its Compounds	Good	Does not require Assessment	Good (class 5)	
Dioxins and dioxin-like compounds	Good	Does not require Assessment	No Data Available	
Heptachlor and cis-Heptachlor epoxide	Good	Does not require Assessment	No Data Available	

Appendix F: Ferris Meadow Lake Water Quality Assessment

Determinand	WFD 2019 Status	WFD 2022 Status	Ferris Meadow Lake	Comment
Hexabromocyclododecane (HBCDD)	Good	Does not require Assessment	No Data Available	
Hexachlorobenzene	Good	Does not require Assessment	LOD Fail	LOD above MAC EQS standard
Hexachlorobutadiene	Good	Does not require Assessment	Good	
Hexachlorocyclohexane	Good	Does not require Assessment	Good	
Mercury and Its Compounds	Good	Does not require Assessment	Good	
Nonylphenol	Good	Does not require Assessment	No Data Available	
Pentachlorobenzene	Good	Does not require Assessment	No Data Available	
Perfluorooctane sulphonate (PFOS)	Fail	Does not require Assessment	Good	
Polybrominated diphenyl ethers (PBDE)	Fail	Does not require Assessment	Good	
Quinoxyfen	Good	Does not require Assessment	Good	
Tributyltin Compounds	Good	Does not require Assessment	Good	

Appendix F: Ferris Meadow Lake Water Quality Assessment

Table A-4: Chemical Priority Substances

Determinand	WFD 2019 Status	WFD 2022 Status	Ferris Meadow Lake	Comment
Aclonifen	Good	Does not require Assessment	Good	
Alachlor	Good	Does not require Assessment	Good	
Benzene	Good	Does not require Assessment	Good	
Bifenox	Good	Does not require Assessment	Good	
Cybutryne	Good	Does not require Assessment	Good	
Cypermethrin (Priority)	Fail	Does not require Assessment	LOD Fail	LOD above MAC EQS standard
Dichlorvos (Priority)	Good	Does not require Assessment	LOD Fail	LOD above MAC EQS standard
Fluoranthene	Good	Does not require Assessment	LOD Fail	LOD above MAC EQS standard
Lead and Its Compounds	Good	Does not require Assessment	Good	
Nickel and Its Compounds	Good	Does not require Assessment	Good	
Octylphenol	Good	Does not require Assessment	No Data Available	
Terbutryn	Good	Does not require Assessment	Good	

Contact

If you would like to contact us outside of your response to this consultation, you can use one of the options below:

Email: **enquiries@riverthamesscheme.org.uk**

Web: **www.riverthamesscheme.org.uk**

Telephone: **03456 009 009**

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If you would prefer this brochure in large text, a different format or language please contact using the details below and we will do our best to help.

Text (SMS): **07860 053 465**
(for the deaf or hard of hearing community)

Textphone (via Relay UK): **18001 03456 009 009**

British Sign Language: **www.surreycc.gov.uk/bsl**

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