

Appendix 1

Report by Aquascience

Potential aquatic ecological threats to the River Itchen from the Eastleigh Borough Submission Local Plan

August 3rd, 2018

On behalf of the Add Campaign

Prepared by: Dr. Nick Everall MIFM C Env

☎ 01246 239344

✉ nick@aquascienceconsultancy.co.uk

This short report has been produced by Aquascience Consultancy Limited within the terms of the contract with the client and taking account of the resources devoted to it by agreement with the client. We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

Instruction from ADD

The instruction from John Lauwerys of the ADD Campaign was to assess the Submission Local Plan and its evidence base in relation to the question of whether Strategic Policies S5 and S6 will have an adverse effect on the integrity of the River Itchen SAC.

Dr Everall's qualifications and experience

I hold a BSc Honours degree in Zoology from the University of Hull and a Doctorate in Fisheries Ecotoxicology from Trent Polytechnic. I have been a registered Member of the Institute of Fisheries Management since 1985 and a Chartered Environmentalist since 2006. I have 32 years operational and research experience in applied aquatic environmental issues. I worked as a scientist on the 'Acid Rain' research programme for the Natural Environment Research Council from 1986-1987. I was a Senior Scientist for the Department of Agriculture and Fisheries for Scotland from 1987-1990 working on polluted salmon rivers. I have taught aquatic biology at degree and M Sc level at Loughborough and Derby Universities. I was the Principal Biologist for Severn Trent Water Ltd from 1990-2001 in charge of all biological and ecological aspects of water treatment, sewage treatment, river quality and site conservation issues for the whole company. For the last 17 years I have worked on ~20 aquatic pollution cases as an Expert Witness for the Courts. I have published ~25 research papers in peer reviewed journals on a number of aquatic environmental issues with many of these publications looking at the monitoring and assessment of the ecological condition of UK rivers. I am currently engaged in a 3 year study with Salmon and Trout Conservation UK and the Environment Agency investigating the water quality and ecological condition of 20 UK river systems. I remain a Director in an aquatic consultancy business established in 2001 and sit on the Board of the National Riverfly Partnership.

Contents

1. Introduction and Background.....4

1.1 Overview of the environmental context of the River Itchen in the proposed land development area
.....4

2. Findings from the assessment of the evidence base

2.1. Supporting evidence reports: Southern Damselfly Survey and Habitat Assessment Study Eastleigh Borough (Rushbrook, 2017) and the Eastleigh Borough Council Habitats Regulation Assessment (EBC, 2018).
.....6

2.2. Supporting evidence reports: Strategic Eastleigh Site Ecological Appraisal (WYG, 2017) and Eastleigh Hydrological Sensitivity Study Task 1 (JBA, 2018).
.....6

2.3. Potential impacts and proposed mitigation measures resulting from ecological, hydrological and habitat assessment reports.
.....10

References

1. Introduction and Background

There is a nice symmetry between the words *ecology* and *economy*, and the reconciliation of these two fields is a key element in defining sustainable development, as against growth urban or otherwise as a domestic product.

The following sections of this report provide a background overview of ecologically important components of aquatic habitats within the proposed works area, a critique of the supporting evidence documents and an expert view upon whether or not the planning Authority have failed to comply with regulations such that it attempts to leave over questions which relate to the significance of the impact on the environment and the effectiveness of any mitigation.

1.1 Overview of the environmental context of the River Itchen in the proposed land development area

Chalk streams like the River Itchen are a globally rare and precious part of our cultural heritage, but many now suffer from human modification and associated pressures including over-abstraction of water, sources of pollution including agricultural run-off, roads plus the spread of industry and urbanisation e.g. new housing. Globally freshwater species have declined by 76% since the 1970's and in England less than a fifth of our rivers are at good or better ecological status with some of these being our iconic chalkstreams although three quarters of them are not currently in good health.

The UK houses 80% of the worlds chalk streams which encourage a diverse and particular flora and fauna. Chalk streams are therefore an important habitat in a national and international context requiring protection from development. They are also a key habitat in the UK Biodiversity Action Plan (BAP). The River Itchen is a Designated Special Area of Conservation (SAC) within the proposed building development areas with the SAC EU code UK0012599.

Condition monitoring by Natural England of the River Itchen Sites of Special Scientific Interest (SSSI) reaches within the proposed works areas are currently classified as unfavourable no change and Environment Agency categorisation under the EU Water Framework Directive as Moderate. Both fishery and ecological condition assessments highlight existing anthropogenic pressures of e.g. nutrient (eutrophication) and sediment impacting the current status of the River Itchen in the proposed work areas.

The River Itchen requires appropriate assessment of impacts at any proposed development sites impinging upon the river for all features of European importance. For the Itchen these are:

Annex I Habitat

3260 Watercourse of plain to montane levels with the *Ranunculus fluitans* and *Callitriche-Batrachion* vegetation. The Itchen is a classic example of a sub-type 1 chalk river.

Annex II species

1044 Southern damselfly (*Coenagrion mercuriale*).

1163 Bullhead (*Cottus gobio*)

1092 White clawed crayfish

1096 Brook lamprey (*Lampetra planeri*)

Other species of national and international importance within the framework of an Annex I SAC chalk river are Otters and Atlantic Salmon (*Salmo salar*) which is a genetic sub-species in UK chalk rivers like the River Itchen and very rare. Similarly, vulnerable and protected species like Sea Trout and Sea Lamprey or many aquatic invertebrates like e.g. The BAP (Biodiversity Action Plan) Southern Iron Blue (*Baetis niger*) or the Red Data Base caddis *Ylodes conspersus* or Stratiomyidae (Soldier flies) which have all been recorded in the lower Itchen in recent decades.

I saw no mention of water voles, another protected species, in any of the recent HRA or Ecological survey reports but if the developments are not allowed within a certain distance of the rivers edge then it may be considered there will be no direct impact upon water voles or maybe there are none left in this reach of the river although I believe there are at least some on the upstream Itchen Navigation. If they are in the area, then there may be populations in any suitable habitat feeder streams to the River Itchen within the development areas which require benchmarking and protection. For all of the aforementioned species and any other aquatic fauna in the receiving watercourses for this development they are all vulnerable, particularly in their early life stages (spawning-eggs-larvae), to the typical contaminants associated with both the building and final infra-structures associated with urban developments.

Land use change, associated with parts of these proposed developments, have elsewhere been well documented as a significant cause of global ecosystem degradation (OECD, 2008 and IUCN, 2009). They are one of many examples of narrowly focussed development decisions resulting in the cumulative and sometimes longer-term to manifest reductions in ecosystem integrity and functioning (Everard and Appleby, 2009). In Europe the Water Framework Directive has guidance that is designed to avoid disproportionate costs of action in relation to development in water catchments and as a result 'cost-beneficial' has become an un-acknowledged but nonetheless real key

criterion for decisions on remedial action to development rather than the ‘precautionary principle’.

2. Findings from the assessment of the evidence base

2.1. Supporting evidence reports: Southern Damselfly Survey and Habitat Assessment Study Eastleigh Borough (Rushbrook, 2017) and the Eastleigh Borough Council Habitats Regulation Assessment (EBC, 2018).

I would comment that The Southern Damselfly is the only British resident dragonfly to be listed on Annex 11 of the Habitat Species Directive. It is also listed on Schedule 5 of the Wildlife and Countryside Act 1981 (which protects it against a variety of factors including damage or destruction of habitat), and in Appendix 11 of the Berne Convention. It is listed as rare (category 3) in the British Red Data Book and also features on the red list of other countries in Europe (source: Hampshire Biodiversity Partnership). The UK Biodiversity Steering Group published the UK Biodiversity Action Plan (BAP) in 1995 and identified the Southern Damselfly for conservation action. The UK BAP accords with, and implements the UN Convention on Biological Diversity, signed at the Rio Earth Summit in 1992. The Southern Damselfly has metapopulation dynamics, is a poor disperser and it has been shown that populations within a km or so can have different population genetics. I would conclude that it is vital for the population in the Itchen Valley that the meta-populations stay linked and intact.

A similar view was reached in the Rushbrook (2017) report: The results of the desktop and field studies indicate that Highbridge Farm, Allington Manor Farm, and Itchen Valley Country Park support the only strong populations of southern damselfly located in and immediately adjacent to Eastleigh Borough, and are the three most important sites within this area. Furthermore, given its location at and immediately beyond the northern boundary of the borough, Highbridge Farm is also considered strategically important in connecting sites across the wider Itchen Valley metapopulation.

However, Eastleigh Borough Council’s assessment of River Itchen sites under the umbrella of the proposed works states on page 133 of the HRA (Eastleigh Borough Council, 2018) that Highbridge, where road bridge works are proposed, is not critical to the Southern Damselfly population. As the Highbridge population in these reaches of the River Itchen is central then this population is key to the overall metapopulation to prevent it becoming fragmented and a worrying misinterpretation of the evidence by the planning Authority. Even if mitigation measures were considered in principle then this species is so rare that it is hard to believe that something as environmentally impacting as road development is even being considered at this site. WYG (2017) appeared to be of similar opinion when they make the statement, although still supporting river work, ‘It is recommended that the improvements to Highbridge include footings and construction activities taking place outside the SAC’. Reporting Highbridge as being non-critical to the Southern Damselfly population fails to adequately report the potential adverse impacts of the proposals on this damselfly population. Consequently I am not satisfied

that the impact on the Southern Damselfly population is adequately safeguarded by the plan.

2.2. Supporting evidence reports: Strategic Eastleigh Site Ecological Appraisal (WYG, 2017) and Eastleigh Hydrological Sensitivity Study Task 1 (JBA, 2018).

It is important to remember the context or scope of this report which is highlighted in their own summary: An Ecological Appraisal following CIEEM 2013 guidelines to identify the presence of and potential for notable habitats and species which could present a constraint to development, and where necessary to recommend further surveys and outline mitigation proposals. It also needs to be understood that the WYG (2017) report was put forward by the developers of the site and is not an evidence base produced by the Council.

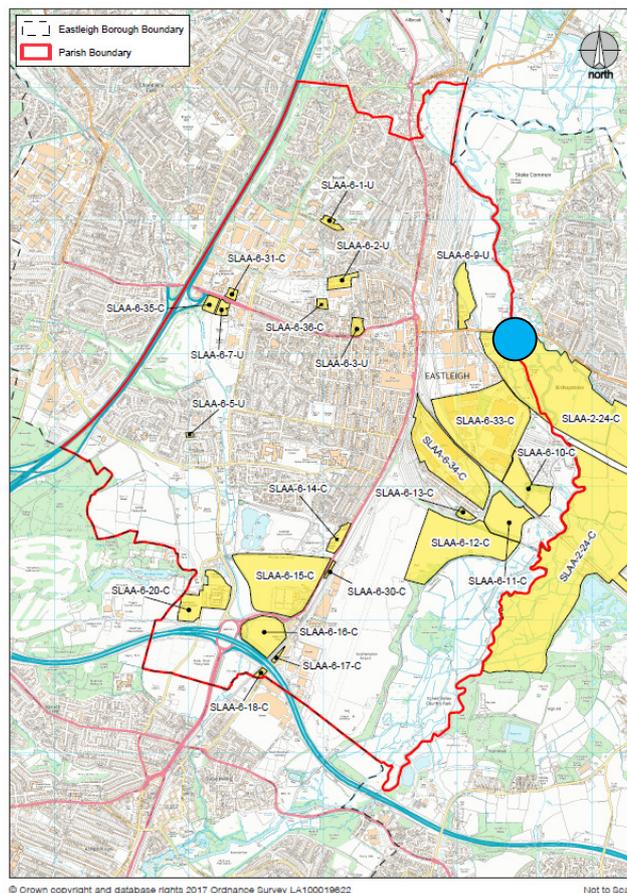
Aside to the main River Itchen the report summarises some aquatic surveys of wetlands within the proposed work areas and concludes that based on the results of the Arcadian Ecology report (2016) the Site is assessed as offering low to moderate potential to support notable aquatic invertebrates. However, the report contains statements like ‘the stream was not surveyed in detail but is likely to be of value as it flows into the River Itchen SAC’ and recommends ‘further aquatic surveys’ in summary sections. Even if many of these chalk Itchen feeder streams and ditches are perennial I find it hard to believe that they will not contain notable or even Red Data Base aquatic invertebrates as they are found from records in the nearby main river. I suspect as recognised by Arcadian Ecology that more detailed species level surveying of aquatic habitats is required to get a better handle on the notable aquatic invertebrate status in the feeder and standing watercourses to the River Itchen in the proposed works area prior to any final decision making.

The aquatic invertebrate condition of the River Itchen is mentioned by Arcadian Ecology under the umbrella statement that an HRA (Eastleigh Borough Council, 2018) to address the potential for adverse effects upon the River Itchen SAC was required. However, said HRA (Eastleigh Borough Council, 2018) pays scant attention to existing invertebrate data for the River Itchen, other than Annex I species like the Southern Damselfly and so their assessment appeared to be over looked in these initial scoping documents other than further aquatic invertebrate surveying being mentioned. As WYG (2017) point out and I fully endorse, that to support a proposed strategic growth area north of Bishopstoke and Fair Oak and associated link road, it is recommended that terrestrial invertebrate surveys and further aquatic invertebrate surveys are completed to identify the assemblage on Site, identify areas of greatest value and inform mitigation, compensation and enhancement proposals.

The current report and resultant HRA (Eastleigh borough Council, 2018) with respect to aquatic invertebrates in feeder streams and ditches to the River Itchen, other than the Southern Damselfly, is an honest assessment with the available data however the available data appeared to be relatively scant and so limited to what the report could say.

There was also no aquatic invertebrate data presented for the main River Itchen, other than the Southern Damselfly, despite such data being available as highlighted below. There was certainly marked uncertainty in the quantity of the current aquatic ecological survey data to assess the ecological condition, impacts and required mitigation of the proposed work plans.

There have been species level aquatic invertebrate surveys in the River Itchen within the study area in recent years by both independent qualified ecologists with the S & TC/EA National Riverfly Census (Measham, 2015 ongoing) and the Environment Agency have a routine biological or General Quality Assessment (GQA) sample point in the main River Itchen at Bishopstoke which I have marked this with a blue circle on the map below for context.



It is important to understand the species found here with respect to their tolerances to existing documented anthropogenic pressures in these reaches of the River Itchen which are currently un-favourable for e.g. nutrient enrichment and sediment plus the risks of any increase in these stresses from the proposed works. The paucity of the current aquatic ecological survey work or existing data analyses presented in the ecological and habitat assessment reports to date cannot fully address potential adverse effects of water pollution, physical modification, nutrient enrichment siltation or water abstraction if it

does not yet fully comprehend the aquatic species rarity present and therefore the known cause and effect relationship with these variables from the scientific literature. At present the ecological survey report has the caveat 'To support allocation, it is assumed that notable invertebrates are present on site, and that suitable mitigation measures are achievable given the large amount of open space included within the Site' (WYG, 2017).

Assumptions can be superseded by facts because recorded within or just upstream of the works reaches of the River Itchen in recent decades has been the documented Southern Damselfly, the BAP Southern Iron Blue, the RDB caddis *Ylodes conspersus*, the Nationally Rare mayfly *Labiobaetis atrebatinus*. Nationally scarce Soldier Fly *Oxycera mossellii* and in-determined Soldier Fly species many of which may or may not have been Red Data Base species had they been speciated. All of these species are variably susceptible, amongst other stresses, to elevated levels of nutrient (phosphate, nitrate ...) and suspended solids as well recognised by Natural England in their condition assessments and what is sometimes missing from statutory protection by biological WFD standards. The latter was recognised by the local EA in 2017 with new local more stringent aquatic invertebrate species level biological standards being applied to the middle-lower Itchen in the form of cumulative annual mayfly species richness, PSI - sediment trait specific biological stress measure and autumnal shrimp (*Gammarus pulex*) abundance thresholds.

Part of this impact assessment and mitigation measures results from understanding the hydrological (abstraction) dynamics in the watercourses of the proposed works area which appear currently reliant, in large part, upon the Eastleigh Hydrological Sensitivity Study (JBA, 2018). The HRA (Eastleigh borough Council, 2018) refers to the hydrology report (JBA, 2018) when it states, 'A detailed hydrological study is completed to understand how the headwaters at the Site are fed and hence subsequently the River Itchen'. The data used in the JBA (2018) report is EA monitoring data which can be methodologically, spatially and temporally limited. Therefore, any statement made is limited by the lack of quality in underlying data. The report itself on page 11 claims 'Data has been obtained from readily available sources, including data requests and online information. However, limited site-specific data are available to provide detailed interpretation about the functioning of each headwater area.' Indeed, most of the recommendations in JBA (2018) relate to more information being required. The current JBA (2018) report has gathered readily available data to inform the conceptual understanding of the hydrological functioning of the headwater stream across the area of the proposed NBLR.

Further data, presumably not available to date, which would support this understanding at a site-specific level could include:

- Spot flow gauging should be continued by the EA at Stoke Common on Bow Lake watercourse to provide confidence in the contribution of flows being made from this area to the main River Itchen;

- Water quality data in headwater areas - to better characterise the stream quality. In addition, it would be useful to collect further water quality data from the existing EA sampling points identified in Table 2. For example, EA WQ point 11 is located at a proposed river crossing;
- Ground investigation (e.g. auguring or installation of piezometers) to obtain more site-specific data regarding the nature of the underlying geology and hydrogeological permeability (falling head tests); and
- Environment Agency chalk groundwater levels - obtain these data as these would indicate if there is an overall upward groundwater gradient, and how effectively groundwater levels are being confined by the London Clay” (page 14)

In overview I would say the report is valid given the limited information but is not sufficient as an impact assessment. In my opinion it certainly does not address potential adverse effects of water pollution, physical modification, siltation or water abstraction. The data is simply not sufficient to do so and so it makes no attempt to achieve this. It asks the question how based upon this benchmark hydrological study Eastleigh Borough Council can make the statement ‘As such it is considered that the risk of development in the vicinity of the headwater is low subject to the proposed mitigation and design measures’ in their current HRA (Eastleigh borough Council, 2018).

2.3 Potential impacts and proposed mitigation measures resulting from ecological, hydrological and habitat assessment reports.

Some important points to bear in mind about assessing potential impacts (risks) and appropriate mitigation:

- The Precautionary Principle. “... Precaution is now an established principle of environmental governance and, in the face of risks to health or the environment, it involves acting to avoid serious or irreversible potential harm despite lack of scientific certainty...”
- If a preliminary scientific evaluation demonstrates reasonable doubt as to the absence of adverse effects on the integrity of a SAC, it cannot be concluded that it would not have such effects. Further evidence would be required. That is the position here.”

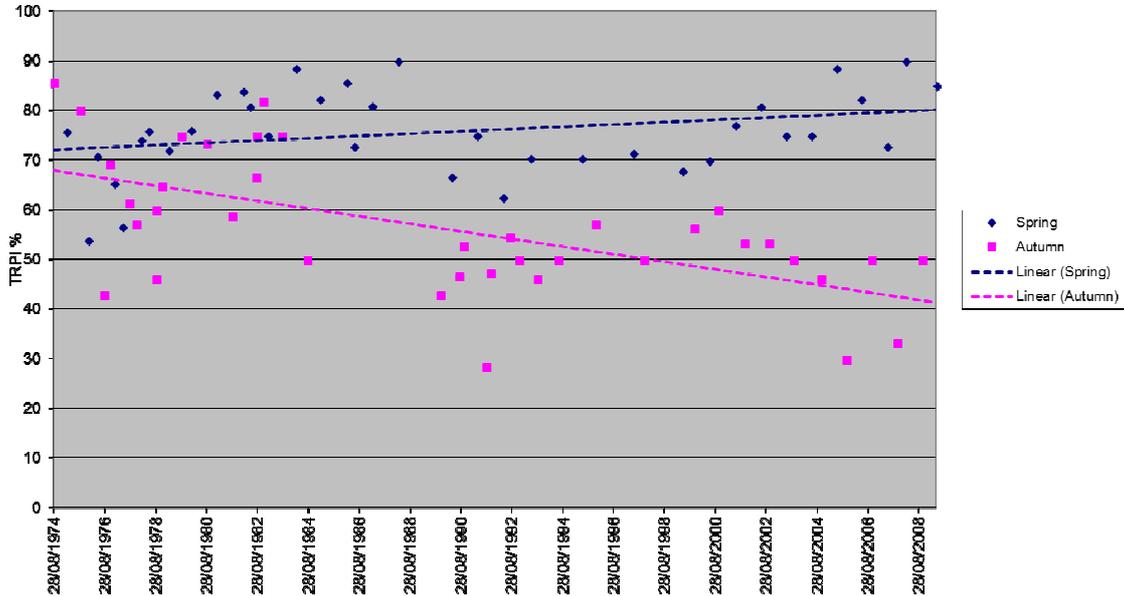
All the evidence I have seen, supported by the various ecological and habitat survey reports (Rushbrook, 2017, WYG, 2017 and Eastleigh Borough Council, 2018), indicates that Precautionary Principles need to be applied to this scheme at this stage. The HRA (Eastleigh borough Council, 2018) points out that ‘In the absence of mitigation it cannot currently be concluded that development proposed in the Eastleigh Borough Local Plan will not have an adverse effect on the integrity of the River Itchen SAC as a result of the following impacts: noise and vibration; hydrological impacts (SGO); land outside of European site boundaries (otter corridors); invasive non-native species and site-specific

hydrological impacts; water abstraction; and water pollution'. Understanding Cause and Effect is critical to applying sound precautionary principles and understanding the detailed nature of both the likely environmental stresses and the recipient fauna's response to such pressures.

Environmental stresses include the discharge and runoff from urban drainage, engineering works such as road improvement schemes (e.g. the new Allbrook Hill-Bishopstoke-Fair Oak link road, including the new bridge over the Itchen at B3355 Highbridge Road), contaminated land and other industrial and domestic sources also results in pollution of groundwater and surface water. This can result in an overall deterioration of water quality locally as well as on a wide spread scale, which in turn is likely to impact the ecology within designated sites and surrounding areas. During the operational phase, the increase in developed areas can result in an increase in suspended solids within surface water and impact upon water quality in receiving waters. Depending on their composition, suspended solids can lead to changes in nutrient, organic or chemical loading. In addition, increased suspended solids can alter the flow path for the runoff as sediment becomes deposited altering natural flow paths. Where additional sediment is deposited within the river system this can impact upon migratory and spawning fish and feeding patterns. There is a reasonable amount of information upon the unique and iconic Itchen salmon stocks with the Environment Agencies most recent assessment of salmon population in the River Itchen in 2016 stating that stocks were 'Probably at Risk' and stocks of juvenile fish 'low and declining'. None of this appeared to register within the Planning reports at this stage. The salmon population of the River Itchen is clearly impacted by current anthropogenic stresses and the risk of further e.g. sediment and nutrient input from routine or pollution related construction, SuDS operations, pressure on sewage works capability and abstraction demands resulting from the proposed works appeared very high when the desired level of protection is high as afforded to a Special Area of Conservation like the River Itchen.

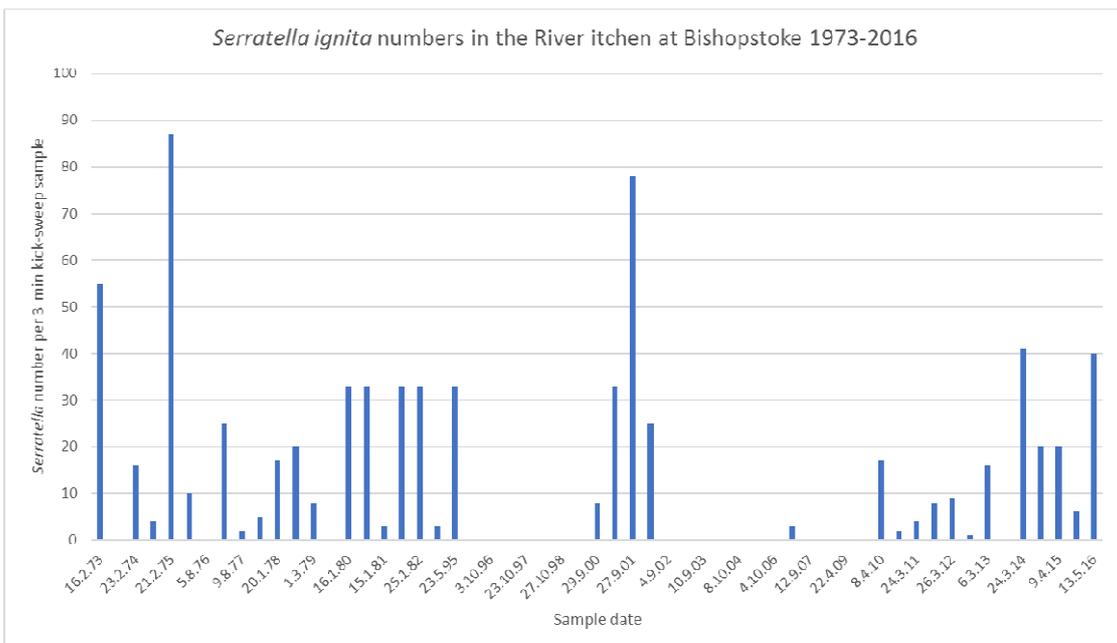
The same risks apply to the faunal communities that were discussed on page 10 of this report and that fauna are the life blood of SAC chalk aquatic ecosystems. There is a dearth of information upon the impacts of e.g. both nutrient and fine sediments upon the aquatic invertebrate fauna of receiving waters like the Itchen wetlands. Fine sediments are well documented in the literature to associate with building and SuDS run-off (Herricks, 1995) and concerns over nutrient levels where there are there are concerns over the concentration of phosphate permitted to be discharged from Chickenhall WWTW (River Itchen SAC) and Peel Common WWTW is expected to reach overall capacity in 2025 (Solent Maritime SAC / Solent and Southampton Water SPA/Ramsar). The River Itchen downstream of Chickenhall WWTW had shown signs of phosphate enrichment from the Environment Agency invertebrate community data in the form of the P trait specific biological indicator known as TRPI or Total Reactive Phosphorous Index (Everall et.al., 2018) as shown in the graph overleaf. The autumn signatures are marked following summer flows and lack of dilution of nutrient P incursions to the river.

River Itchen - Total Reactive Phosphorous Index below Chickenhall STW 1972-2009

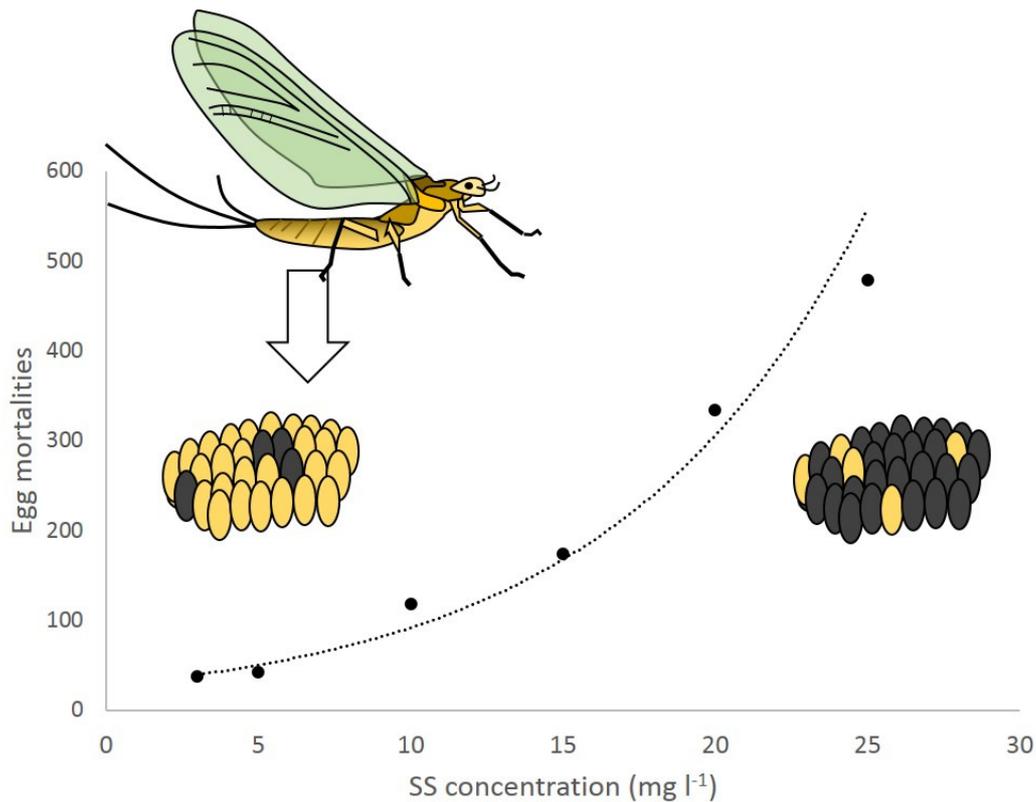


Please note that TRPI is a negative index like PSI and the lower the % the higher the P-biological impact.

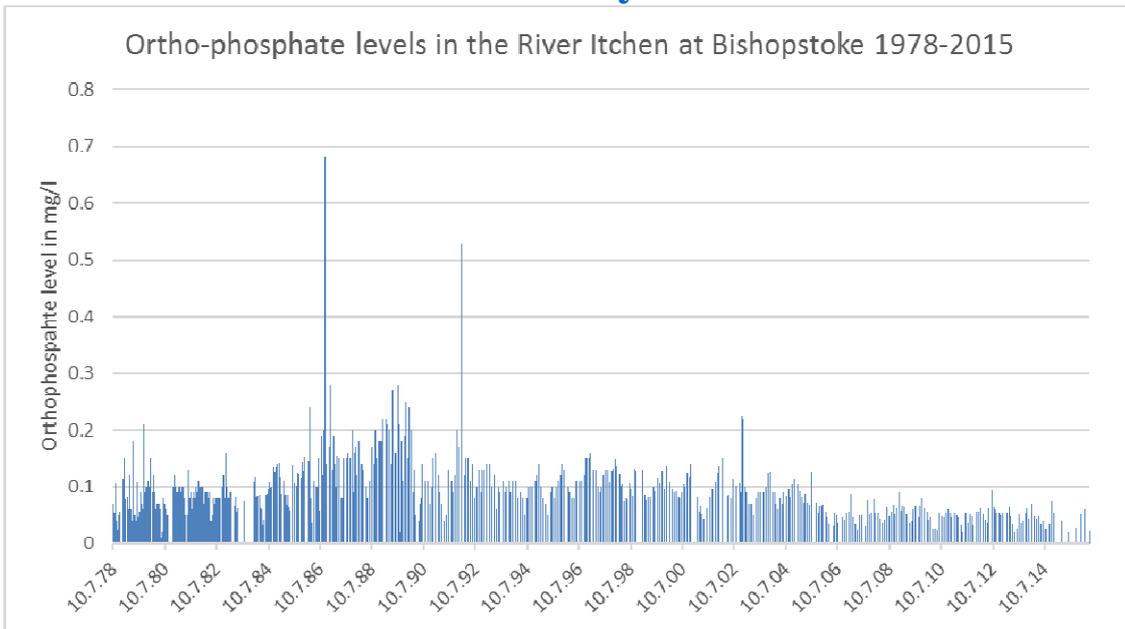
Fine sediments and phosphate levels are all pervasive causes of ecosystem damage at relatively low levels and particularly in sensitive fauna rich wetlands like chalk streams. The River Itchen at Bishopstoke contained a residual population presence of the Blue Winged Olive mayfly (*Serratella ignita*) from 1973 to the present day as shown from Environment Agency data in the graph below (the gaps are years of no monitoring).



Recent research has shown that exposure to an annual average of 10 mg/l suspended solids shown below or 100ug/l orthophosphate kills a proportion off the eggs of the Blue Winged Olive (Everall *et. al.*, 2017) and are thought to be amongst the key stresses behind the disappearance of this iconic chalk stream species across a number of southern chalk wetlands in recent decades.

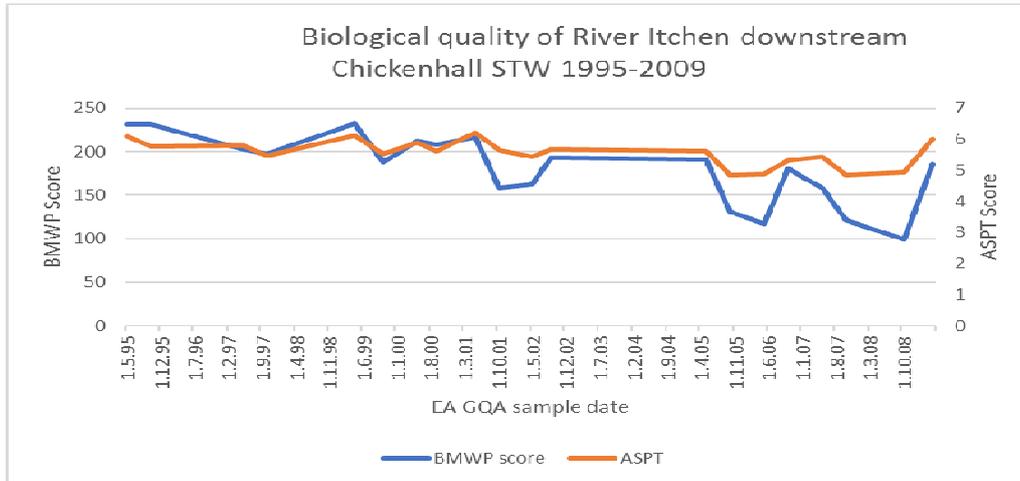


These are the potential cause and effects risks of these developments on these most sensitive of aquatic habitats. For example, any loss of mitigation measures during construction, SUDS operational or control of nutrients at sewage works discharges with future population expansion associate with the proposed works would not take much to break the 0.1 mg/l orthophosphate level required to damage mayfly eggs (Everall *et. al.*, 2017) which the River Itchen at Bishopstoke currently runs below as in the graph overleaf.



Environment Agency data from Bishopstoke chemical GQA site in the River Itchen.

However, there were still biological impacts upon the overall ecological condition of the River Itchen downstream of Chickenhall STW as shown by the simple EA biological measures of water quality of BMWP and ASPT scores in the graph below.



To maintain, or in the case of the reaches of the River Itchen within the proposed work areas, to reach a state of health known as ‘Good Ecological Condition’ and satisfy the SAC protection requirements in this reach of the River Itchen for the purposes of fulfilling the UK’s obligations under the European Water Framework Directive, the Habitats Directive (or similar post-Brexit) and UK Law the river will need to maintain water quantity and water quality to meet the standards required for Good Ecological Condition and sustain a healthy population of designated native flora and fauna WITH NO RISK OF DETERIORATION.

Much emphasis is placed throughout the Planners supporting documentation upon Mitigation of impacts although limited information is currently available on the precise form of these developments, construction methods or timeframe. The exception is water abstraction where the HRA states that revised abstractions licences have been agreed and ecological monitoring, mitigation and compensation measures are in place to ensure there will be no adverse effects on integrity and that the overall coherence of the Natura 2000 River Itchen network is protected (Eastleigh borough Council, 2018). Aside to water abstraction much of the risks of adverse effects on the integrity of River Itchen SAC remained to be carefully reconsidered for the proposed strategic growth area north of Bishopstoke and Fair Oak and associated link road stage because the currently proposed mitigation measures do not, in my expert opinion, ensure that there is no adverse effect on integrity.

The streams and ditches on Site are likely to be retained and used as part of the SuDS strategy for the Site. As such there is potential for adverse effects from sediment and pollution runoff during construction and operation and also modifications to the hydrology of the area. There is also potential for direct effects during construction as crossings will be required of several watercourses to accommodate the bypass and internal road layout (WYG, 2017). Currently, other than principles of mitigation during the construction phases the use of sustainable urban drainage schemes designed to preserve water quality and flows in the Itchen and its tributaries and other flood risk management measures is advocated as required in the HRA (Eastleigh Borough Council, 2018). Flows should either infiltrate directly into ground at source or contain three forms of naturalised filtration to ensure water quality is treated before discharge, and flow maintained at greenfield levels. It is considered that for the proposed strategic growth area north of Bishopstoke and Fair Oak three forms of naturalised filtration would be sufficient to mitigate any potential water quality issues associated with discharges from the proposed development areas. According to the HRA (Eastleigh Borough Council, 2018), the potential for adverse effects resulting from planned development in Eastleigh borough is adequately dealt with by the IWMS Action Plan (Amex Foster Wheeler, 2018) provided that EBC are committed to its implementation and provisions are made for infrastructure upgrades when required and/or adjustments to the phasing of development later in the plan period.

No SuDS scheme provides 100% pollutant removal and their efficacy can tail off over time if not well maintained such that such mitigation measures will always risk impact upon the receiving fauna of the Itchen wetlands. Fine sediments are well documented in the literature to associate with building and SuDS run-off (Herricks, 1995). Fine sediments are all pervasive causes of ecosystem damage at relatively low levels and particularly in sensitive fauna rich wetlands like chalk streams.

Eastleigh Borough Council have currently in effect assuredly answered Yes to these questions under the 5 Step-one test questions of alleged appropriate assessment under the Habitats Regulations procedures based upon the fact that 'mitigation' would deal with any potential arising as 'Taking account of the mitigation strategy, there will be no

indirect effects from noise and vibration, hydrological impacts, otter dispersal corridors, non-native species, water abstraction or water pollution'. Given the lack of in-depth aquatic ecological, hydrological or mitigation details submitted in the planning reports to date I would question this reasoning.

Urban development is globally well documented to cause aquatic ecosystem degradation and since construction schemes and later SuDS schemes do not provide 100% prevention of some degree of contamination to receiving watercourses from heavy metals, fine solids, oils, fuels (polycyclic aromatic hydrocarbons ...), detergents, faecal pathogens, nutrients, domestic pesticides - herbicides and other chemicals associated with urban run-off then I cannot see that building on the potentially proposed scale on a river conduit and porous chalk aquifer is not an unacceptable risk which in my opinion the current proposed mitigation measures will not address given the present condition of the river and the desired level of protection for a SAC. There currently appeared a lack of resolution in aquatic cause and effect data in the survey reports to provide full knowledge of the likely significant effects of the proposed works on the receiving wetlands of the Itchen catchment in the proposed works areas.

The mitigation measures for nutrient appeared to involve major infrastructure investment in P-stripping at sewage works and sewer systems plus associated abstraction predictions from the IWMS report (Amec Foster Wheeler, 2018). Current expert opinion in Amec Foster Wheeler (2018) which I concur with on said mitigation states:

- i. 'Whilst, it is estimated that these solutions could effectively reduce the nitrate and phosphate loading towards the designated sites, there is uncertainty with regard to the timing and scale of environmental improvement that will be achieved'.
- ii. 'There are currently gaps in the evidence base that require further investigation, monitoring and potentially, action, to ensure future growth is compliant with legislation'.
- iii. 'It is not yet known how effective the existing catchment measures will be, but it is hoped that they will deliver improvements'.

Emphasis is placed in various plan support documents on the use of SuDS schemes (Eastleigh Borough Council, 2018 and WYG, 2017) but these are not mentioned in Amec Foster Wheeler (2018) and there were as yet no details other than reference to the JBA SuDS strategy. The only reference, which would explain the lack of SuDS details at present, was in the JBA (2018) report stating: 'With regard to the comments made by the EA in their consultation response regarding flooding, SuDs and pollution prevention methods, these will be addressed in further detail during Task 2 of this programme'.

I fail to see how, given the statements in the IWMS Action Plan (Amec Foster Wheeler, 2018) and the lack of any detail at present on proposed SuDS schemes, that Eastleigh Borough Council can argue in their HRA that the IWMS report demonstrates that the adverse effects from the development would be adequately dealt with? Furthermore, it could be argued from the IWMS and the known nuances of Suds schemes that the effects

of the proposals for the strategic development site and the proposed mitigation measures were uncertain.

Most of the 5,200 dwellings, 30000 m² of employment, new district centre and link road is proposed for development around the headwaters of watercourses that flow directly into the SAC River Itchen. Given that there is uncertainty over the proposed sewage infrastructure mitigation of nutrients (Amec Foster Wheeler, 2018) and that SuDS remediation cannot provide 100% nutrient removal over time then this scheme will have some future impact upon nutrient composition of water flowing into and the eutrophication status of the River Itchen.

Given that the reaches of the River Itchen within the proposed works areas is already failing e.g. nutrient and sediment (according to Environment Agency and Natural England condition assessments) then at the very least a 'worst case' approach should be employed to feed through any envisaged mitigation measures and to optimise any effects of the development on the environment or the proposed strategic growth area north of Bishopstoke and Fair Oak and associated link road should be rejected if the scientific uncertainty on impacts and success of mitigation remain un-resolved. The risks to the aquatic environment are high and the required level of protection is high given that the River Itchen is a Special Area of Conservation.

4. References

Amec Foster Wheeler (2018). Integrated Water Management Study. Amec Foster Wheeler Environment & Infrastructure UK Limited, 53pp.

Arcadian Ecology (2016). Assessment of the ecological value of aquatic macroinvertebrate communities. Eastleigh Borough Council Headwaters Project

Eastleigh borough Council (2018). Habitats Regulations Assessment, UE0247HRA-Eastleigh LP_3_180622, 209pp.

Everall, N.C., Johnson, M.F., Wood, P. and Mattingley, L. (2017). Sensitivity of the early life stages of a mayfly to fine sediment and orthophosphate levels. Environmental Pollution, 1-11, <https://doi.org/10.1016/j.envpol.2017.10.131>

Everall, N.C., Johnson, M.F., Wood, P., Paisley, M.F., Trigg, D.J. and Farmer, A. (2018). The assessment of phosphorous enrichment in rivers using macroinvertebrate community response: The Total Reactive Phosphorous Index. Ecological Indicators, in review.

Everard, M. and Appleby, T. (2009). Safeguarding the societal value of land. Environmental Law and Management, 21, 16-23.

Herrick, E. E. (1995). Storm water run-off and receiving systems. Impact, Monitoring and Assessment. CRC Press, 458pp. ISBN 1-56670-159-7

JBA (2018). Eastleigh Hydrological Sensitivity Study Task 1. Revised report and technical appendices.45pp.

Measham, N. (2015). National Riverfly Census. Interim report from Salmon and Trout Conservation UK, 45pp.

Natural England (2014). European Site Conservation Objectives for River Itchen Special Area of Conservation. Site Code: UK0012599.

Rushbrook, B. (2017). Southern Damselfly Survey and Habitat Assessment Study Eastleigh Borough, Arcadian Ecology, 117pp.

TOWN AND COUNTRY PLANNING (2017). No. 571. The Town and Country Planning (Environmental Impact Assessment) Regulations 2017, 76pp.

WYG (2017). Strategic Eastleigh Site Ecological Appraisal, The Highwood Group and Drew Smith Group, 64pp.