Appendix 1:

Measures to be funded through the Developer Contributions Scheme 2 (DCS2)

FINAL VERSION (June 2016)

The need for DCS2 has been identified in response to the development allocations within the North West Leicestershire District Council Local Plan, which is currently being finalised. The Local Plan was subject to assessment under the Habitats Regulations[1] and the Developer Contribution Scheme was identified as a key mechanism to provide NWLDC with the necessary confidence that development allocated within the catchment of the river will not be likely to have a significant effect on the River Mease SAC.

The HRA of the Local Plan identified the need for DCS2 to deliver mitigation to facilitate the delivery of 1826 dwellings. On the basis of the estimated P loadings to the river from receiving works provided in E&F of DCS2, an estimate of phosphate contributions from these dwellings represents an increased loading of **329g P/day**.

Of critical importance to the development of DCS2, is an agreement which has been reached since the development and implementation of DCS1. Following recent discussions between Natural England, the Environment Agency and Severn Trent Water, the following statement has been issued.

Severn Trent, Environment Agency and Natural England have assessed the options to meet the SAC conservation objectives in relation to flow and phosphate, and agree that pumping sewage effluent from Packington and Measham sewage works out of the Mease catchment is the most effective long term solution.

The primary reason to move flow out of the River Mease catchment would be to ensure the SAC flow targets are met. In addition this will also remove phosphate for which the River Mease is currently failing to meet the SAC target.

All parties are committed to working together to progress the development of an appropriate scheme with a view to it being included in the next round of the asset management planning process for scrutiny within the 2019 Periodic Review.

It is fully accepted by all parties that implementation of such a solution will take time and would be subject to appropriate scrutiny by OFWAT in respect of the necessary investment costs by Severn Trent Water being passed onto their customers.

[1] Shadow Habitats Regulations Assessment to inform the HRA of the Local Development Plan, DTA Ecology June 2016.

'Short term' measures

Installation of silt traps

Phosphorous release from silt can/will occur under anoxic and anaerobic conditions. In rivers, such conditions tend not to exist in thin layers of mobile silt, but tend to develop if significant silt accumulations are formed in slow moving sections of the river.

Road run off, especially where roadsides are being eroded, and the decomposition of organic matter are often the more important sources of phosphate release in rivers.

The use of silt traps can reduce total phosphorous in a river, as a consequence of removing silt holding phosphorous that has the potential to become soluble phosphorus downstream. The size of the reduction may be dependent upon the nature of the silt captured, but the more organic material capture the better.

Silt traps are normally constructed with a 'wetland' i.e. a water holding pond, planted up, with the actual silt trap structure at the end letting water out. The removal rate therefore increases when the phosphorous taken up by the wetland is considered.

Work on the River Eye with the installation of silt traps has resulted in a total phosphorous removal rate in the region of 50%. This concurs with research work undertaken by Lancaster University where it has been determined that phosphorous removal efficiencies of well designed sediment traps are likewise around 50%.

A good level of monitoring and maintenance is required for silt traps, both to remove silt captured and also to harvest the wetland plants at the end of the growing season to prevent die back and return of phosphorous to the river. The amount of phosphorous removed by harvested wetland plants can be quantified as 1 gram of phosphate per 5 kilograms of plant material such as reeds. On a precautionary basis, it is estimated that the installation of silt traps will remove 25% of total phosphorous.

DCS2 funds will deliver silt traps to remove 329g P/day based on flow and average phosphate levels at that location. Three potential locations have been identified by the Technical Group.

The need for long term measures in DCS2?

Silt traps start to remove phosphorous as soon as they are installed and will therefore deliver phosphorous reductions immediately, allowing development to come forwards. The approach taken in DCS1 recognised that the ongoing management and maintenance requirements associated with silt traps meant that, they are not considered to be sustainable in terms of delivering benefits over the lifetime of the development. As such, in DCS1 silt traps were not considered to be sustainable in the longer term, and they were regarded as a 'short term' measure. A key component of DCS1, in recognition of this, was the requirement to ALSO deliver additional longer term sustainable phosphorous removal measures, which can effectively *replace* the reductions which will be achieved through use of the any 'short term' silt traps. These were to be delivered in parallel with the short term silt trap measures. DCS1 assumes that once the long term measures are sufficiently established to provide phosphate removal benefits to the river any 'short term' silt trap measures will no longer be required and it is envisaged that any such silt traps will then be removed.

The agreement reached by Severn Trent Water, the Environment Agency and Natural England in respect of the commitment to work together to progress the development of a suitable scheme for *pumping sewage effluent from Packington and Measham sewage works out of the Mease catchment* represents material information which is highly relevant to the drafting of DCS2. Approved schemes are subsequently assigned to a programme of works for delivery between 2020-2025. As such, in respect of the impacts associated with development which connects to Packington and Measham treatment works, measures to offset the impacts associated with increase phosphate loading to the River Mease SAC no longer need to be scrutinised in light of the 'lifetime of the development'. Instead measures need to be sufficient to offset effects that might arise pre-2025 (or earlier if a scheme is scheduled for delivery within the programme of works before 2025). Of the 1,826 dwelling assigned to DCS2, 1,288 connect to either the Packington or Measham sewage treatment works. It would not be appropriate for developer contributions to deliver 'long term' measures in respect of such development as the impacts to the SAC will only exert an effect in the short term (pre 2025).

The decision to pump flows to Packington and Measham out of catchment will not however provide any benefits in respect of flows to other works within the catchment. As such it is still appropriate for DCS2 to also deliver 'long term measures'. Long term measures are required in respect of the dwellings which are anticipated to connect to the other, smaller works within the catchment. It is not known at this time which works the 'windfall' allocations might connect to. On a precautionary basis therefore, it is assumed that all the windfall development connects to one of these smaller works. **On the basis of the figures provided in table F.2 in the DCS long term measures are therefore required in respect of the delivery of 538 dwellings which are associated with a contribution of 89g P/day.**

'Long term' measures

There are various measures which would result in longer term reductions in phosphate levels within the river. DCS1 is delivering all the necessary long term measures through the implementation of actions identified in the River Mease Restoration Plan; work along seven reaches is being funded.

With regards the measures for DCS2, **Two reaches identified by the Technical Group include projects that could take place in the very near future as necessary landowner liaison is already underway.** These schemes are therefore considered to be 'secure' and can be funded by developer contributions.

River Restoration Plan Schemes

Restoring a river to a more natural state clearly has significant benefits for river biodiversity and water quality. A river's ability to function as a diverse ecosystem, including its ability to 'clean' itself through its management of silt and nutrients in a sustainable way is highly dependent on a naturally functioning river channel and connectivity to its vital floodplain.

The River Mease River Restoration Plan, prepared by Natural England and the Environment Agency, sets out a vision for the SAC that addresses past modifications; restoring and enhancing natural river function which in turn will improve water quality and the river ecosystem. The plan sets out a long list of specific restoration proposals, with estimated costs. The plan refers to the Developer Contributions Scheme as one of the potential funding mechanisms.

The floodplain has the potential to take up phosphorous from the river. A properly functioning floodplain, typically supporting woodland or wet grassland habitats, slows down surface water input and therefore reduces sediment and the phosphorous it carries being brought into the river via surface water, and also allows the river to undertake the natural process of sediment deposition onto the floodplain in flood situations. Furthermore, taking floodplain land out of agricultural production removes the input of phosphate rich fertilisers or organic matter from that land. Re-profiling of river banks contributes to the reconnection of the river to its floodplain by enabling flood water to spill into the floodplain where modified banks have prevented this in the past.

As explained above for silt traps, wetland creation, if properly managed provides plant material to take up phosphorous. Likewise, riparian planting will also take up nutrients. Weir removal brings back the river's ability to properly manage its silt, and therefore phosphorous within that silt, and prevents the retention of phosphorous laden silt behind weir structures.

Whilst all actions to restore a more natural river function will contribute to the river's ability to manage and reduce nutrients, in proposing projects to be funded by the developer contributions scheme those that have more direct and clear links to phosphorous removal have been identified. Projects within the plan are divided into reaches, and there are 22 reach projects where the action will result in a clear phosphorous reduction.

Whilst the scientific justification for the fact that phosphorous will be removed is considered to be robust, the scheme specific uncertainties mean that exact figures for the amount of phosphorous that will be removed by each project cannot be provided. However the Technical Group have agreed a precautionary approach to estimating the removal of phosphate that might be associated with each 'stretch'.

Precautionary calculations of total phosphorous removal for river restoration projects:

a) P removal during flood conditions:

Average total phosphorous concentration in the River Mease = 0.32mg/l
Average flow in the River Mease, based on 5 sample locations provided by EA = 0.5 m3 per second
= 43200m3 per day
=43200000 litres per day
X 0.32 to get the mg of P per day = 13824000 mg P per day = 13824 g P per day
25% of P removed = 3456 g P, but as this is only 10% of the time then
10% of 3456 = 345.6 g P per day, on average.
If we divide this by the 22 reaches where phosphorous removing projects are proposed, then = 16 g P per day per reach

b) Phosphorous removal through amelioration of surface water input

From above calculation the river carries 13824 g P per day. Diffuse sources contribute an average of 11.7% of the overall load[1].

The measures delivered through the Restoration Plan are carried out on land adjacent to the SAC itself. The phosphorous load within the SAC associated with surface water run-off will be derived from two sources: i) the tributaries joining the river along the length of the SAC and ii) directly from land adjacent to the SAC itself. The Restoration Plan measures will only reduce surface water phosphorous load from land adjacent to the SAC itself (source ii). On a precautionary basis it is estimated that the delivery of the Restoration Plan measures along the length of the SAC itself will reduce the diffuse phosphorous load by 20%.

Diffuse P load = 11.7% of 13824 = 1520 g P per day
20% of diffuse load = 304 g P per day
If we divide this by the 22 reaches where phosphorous removal projects are proposed, then = 14 g P per day per reach

Overall phosphorous removal

Combining the figures (a) and (b) above, the overall phosphorous removal from the delivery of the River Restoration Plan measures is:

16 + 14 = ***30 g P per day per reach***

[1] Source: Environment Agency Review of Consents, River Mease SAC Stage 4 Site Action Plan

Restoration of the disused coal pits

The disused coal pits off Swepstone Road to the south east of Measham are within a stretch of the river not included in the River Restoration Plan. The site is located between stretches GIL005 and GIL006 and is currently the subject of detailed restoration proposals. These proposals relate to the restoration of the disused pits themselves and do not include works along the riverbanks intended to *restore* the healthy functioning of river. The landowner (UK Coal) has however agreed to DCS funding being used to include additional appropriate restoration measures along the river to be delivered alongside the restoration of the disused pits. This scheme delivers equivalent benefits to those identified for a typical stretch within the river restoration plan and is assumed to deliver a reduction of ***30 g P per day***.

COSTINGS

Measures have been identified in respect of offsetting the impacts associated with 329g phosphate. In view of the agreement to pump flows for Packington and Measham out of catchment 'short term' measures are required in respect of the full 329g phosphate. Long term measures are required to offset the impacts associated with flow directed to other, smaller works within the catchment in respect of 89g phosphate.

Overall costs for the measures to be delivered within the first phase of the second development window to remove at least 329g/day in the short and 89g/day in the long term are detailed in Table 1 below.

Table 1: Measures to remove at least 329g P / day in the short term and 89g/day in the long term

P reduction and Monitoring Actions					
Action	**Estimated P reduction (mg P/day)**	**Implementation & maintenance Costs (£)**	**Monitoring approach**	**Monitoring cost (£)**	**Overall Costs (£)**
SHORT TERM MEASURES					
Two silt traps projects at locations identified by Technical Group Costings based per trap a) Land drainage specialist to survey sites, design and oversee works b) Ground works c) Trap checks and maintenance (e.g. clean outs) d) Potential removal at 2031?	228g from location A 100g from location B	<u>Per trap costs</u> a) £10k b) £15k c) £20 d) £5k	Monitoring of water quality entering and exiting the trap, and potentially also take sediment samples entering and exiting. This will verify extent of P reduction and inform future silt trap projects	<u>Per trap costs</u> £30k (up to 2031)	£80k per trap (up to 2031) traps for the DCS2 development window **TOTAL= £160k**

LONG TERM MEASURES					
River restoration projects Specific in river projects (at stretches MEA001and GIL004) to increase natural cleaning capacity of the river, in accordance with the river Restoration Plan. see river Restoration Plan for details	60g	£22K min to £33k max for each reach	tbc	100K To cover all projects	Assume maximum cost of £66k for both reaches and pro rata 66K monitoring **TOTAL = 132K**
Long term measure – Restoration of river stretch alongside disused coal pits Specific in river projects to increase natural cleaning capacity of the river, equivalent to those delivered through the river Restoration Plan.	30g	£20k min -30k max	tbc		Assume maximum cost of £30k and pro rata 34K monitoring **TOTAL = 64K**
Consultancy fees for design and oversight of the necessary work	Implements measures above	£80K	n/a	n/a	**£80K**

Management Actions					
Project officer - staff cost (to cover the Plan period to 2031)	Implements measures above	£25k per year (to 2025) then 15K per year to 2031	Project Officer reports to the Programme Board	none	£25k/annum for 10 years = £250K Plus 15K per annum for 5 years = £75K **TOTAL = 325K**
Project officer's implementation budget - 3 x main campaigns over DCS2 period (one every five years)		20K per campaign	Project officer to provide feedback and a measure of effectiveness of campaigns as part of role, so no additional costs	none	3 campaigns at 20K each = **£60K**
Overall Costs					
Delivery of All Measures	**329 g/day (short term) and 89 g/day (long term)**				**£821K**