WRITTEN STATEMENT

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ON BEHALF OF

GWENT WILDLIFE TRUST

In the matter of:

Public Local Inquiry into the M4 relief road around Newport: The effects of the proposed M4 extension across the Gwent Levels

February 2017

Drainage Strategy - Water Treatment Proposals and Reen Pollution Issues

Gwent Wildlife Trust

Summary

1. We consider that the ES does not provide evidence that the water treatment proposals will be able to maintain acceptable water quality on the SSSI of the Gwent Levels. Nor do they adequately assess the risk of cumulative impacts with existing pollution problems on the Levels.
2. The following key issues have been identified in this submission:

3. The scheme incorrectly states in section 4.1.2 that the road run-off water will 'discharge to the main NRW reens where there is greater flow of water'. Experts such as NRW and Tony Pickup (previously of the Levels Drainage Board) both state strong preference for discharge to NRW Main River.

4. We believe the scheme should have been designed from its inception to outfall to NRW Main River. It appears the engineers have designed the scheme as they would if it were not SSSI, to outfall to the nearest available watercourse, this has put the suite of SSSI at serious risk of significant adverse impacts on their interest from the polluted water from the road.

5. The sluice system on the Gwent levels will result in build-up of water treatment area outfall pollutants in the reen system, due to little or no flow particularly in summer.

6. Some reens and ditches in the vicinity of outfalls are dead-ends. These will result in increasing levels of pollution in deposited sediments due to low flow and pooling. The risk assessments answer 'no' in the box asking the question 'is there a downstream structure, lake, pond or canal which reduces velocity' thereby excluding this issue from consideration in the risk assessments.

7. The HAWRAT risk assessment method was designed for outfalls into a river system and does not adequately evaluate the risks of outfalls into a man-made system of reens, ditches and sluices where flow rates vary considerably and can be as low as no flow (or even as has been observed at Magor, reverse flow).

8. Complicated lay-out of reen and ditches in the vicinity of outfalls at some locations is also likely to lead to low flows and sedimentation including the risk of pollutant build-up.

9. The scheme has not provided any actual data from existing water treatment schemes of a similar scale and design which confirms that the water treatment areas can, at the scale and design proposed, provide the high water quality required to support the SSSI features of the Gwent Levels SSSI.

10. The DMRB risk assessment section 4.5.4 states: *'In addition to the minimal in-reen dilution that can be expected at each WTA outfall for treated run-off, it can be reasonably concluded that departures from existing baseline quality can be expected'.* This statement is effectively saying the pollution in the reens would increase compared to the baseline.

11. The DMRB risk assessments provide 'typical' pollutant removal efficiencies on which the above conclusions are based. We are firmly of the view that there is no guarantee that these stated efficiencies will be achieved. The data from which these figures have been derived are actually offering a range of possible efficiencies, and the 'typical' figures are based on the assumption of middle of the range or average efficiency. The **actual** efficiency could be far lower than the 'typical' efficiencies used in the calculations for the risk assessment, and the Welsh Government has made no attempt to justify its use of such a level.

12. The Gwent Levels already has severe existing pollution problems in the reens, primarily resulting from industry, development, roads and farming. The variations in pollution levels mean that some locations are at higher risk of multiple pollutant risks, and therefore of cumulative impacts. Utilising mean existing pollutant figures in the HAWRAT risk assessment has largely removed exceedances from the data. A number of these pollutants have exceeded Water Framework Directive quality standards.

13. The TATA steelworks area has repeatedly been shown to have elevated levels of a number of pollutants including Cadmium, Selenium, Arsenic and Chloride. Water Treatment Areas 8, 8a and 9 are proposed for this locality but no thorough assessment of cumulative pollution impacts has been completed.

14. In addition, zinc has been recorded at levels well above WFD EQS levels at a number of locations across the levels, mainly relating to industry and roads at Europark, the eastern end of the steelworks, and the south-east and south west of Newport. These sample locations were chosen to align with the M4CaN route and WTA locations and cumulative impacts of zinc from the M4 CaN outfalls and existing exceedances are therefore highly likely.

15. **We consider that it would only take one severe pollution event to cause major ecosystem damage in the reen system of the Gwent Levels**. It could for example, cause an **extinction of rare invertebrate species** which are recognised as being sensitive to pollution. If the figures for pollutants in a reen are averaged over a year (as they have been) it may appear there is no problem. Yet one high exceedance during that period may have caused long term damage to the ecosystem. We have referred in our submission to NRW's concerns regarding this issue. The cumulative impacts of the scheme in combination with existing pollution problems are in our opinion **highly likely to damage the invertebrate features of the Gwent Levels SSSI.**

16. We consider that the M4 scheme has given inadequate consideration to the risk of overtopping of water treatment grassed channels beside the carriageway, which are typically located only 1 metre from the edge of the low embankment next to the SSSI. Once spilling down the embankment any polluted water would enter the newly created reens and ditches linked to the existing reen system, putting a larger area of SSSI at risk.

17. We are concerned that there can be no guarantee given by Welsh Government that the water treatment system will be properly maintained in the long term and as such the risk of elements of poor maintenance resulting in significant SSSI damage cannot be ruled out. The Gwent Levels will therefore be **permanently at an unacceptably higher risk of pollution** as a result of the scheme being implemented. Please refer to Prof Neil Ward's submission concerning this issue, which outlines that major problems have occurred elsewhere and highlights that the M4 CaN Environmental Statement (hereafter referred to as the ES) is deficient in defining how the Water Treatment Areas will be monitored and managed.

18. It must be remembered that the water treatment areas are for **collecting** pollutants. The pollutant load will build up unless a regular programme of sediment and plant cutting removal is undertaken. This can result in an increase in pollutants in the outfall water. Even with regular maintenance, the efficiency of the reed bed and lagoons will

decrease for a period after sediment and plant material removal. We consider the maintenance proposals are insufficiently detailed. Please see Prof Neil Ward's submission.

19. The HAWRAT risk assessment has used the same flow rate for all outfall reens to assess impacts. This will lead to incorrect predictions of dilutions as flow rates will vary, and at some locations and at certain times of year there may be no flow.

20. In a number of locations two treatment areas are feeding into the same reens. For example, water treatment areas 6 and 7 both feed outfall water into Percoed Reen and WTA 8 and 8 (a) both feed into Chapel Reen. This will result in cumulative impacts on these reens. These cumulative impacts have not been assessed.

21. There are existing problems of ground water pollution in the Newport and Tata areas which would be exacerbated by the M4 CaN scheme.

22. The ES states in Table 5.1 in the water treatment area DMRB Risk Assessments document, that the 'significance of potential effects of water quality on the attribute of SSSI Biodiversity' are of 'negligible magnitude' and 'neutral significance' for all 15 water treatment areas. We dispute that Welsh Government has adequately supported this conclusion in its ES.

23. The water treatment proposals and associated water treatment risk assessment have not presented the 'worst case' in its assessment of water treatment efficiency and likely impacts on the SSSI reen system, and in doing so has not properly assessed the 'worst case' impacts on the suite of SSSI.

24. Planning Inspectorate Advice Note 9 (The Rochdale Envelope) states on page 7 para 1 of the text: *'In the course of preparing the ES a developer should seek to identify those aspects that are likely to give rise to significant adverse impacts, such that the* ***maximum*** *potential adverse impacts have been properly assessed'* (emphasis added)

25. We consider that the M4 CaN Water Treatment Area DMRB Risk Assessments have failed to assess the maximum potential adverse impacts of the scheme and the Environmental Statement is therefore inadequate.

26. In addition, we would highlight that reusing steelwork contaminated material under the motorway is another potential pollutant risk in an already complex situation with existing and additional pollution issues resulting from the M4 CaN scheme

27. **In conclusion, we are firmly of the view that the M4 CaN scheme, as proposed in this ES, would very significantly increase the risk of SSSI damage as a result of pollution in the short term, medium term and long term, and if implemented would have failed to protect the SSSI as part of its duty under s28G of the Wildlife and Countryside Act 1981 (as amended)**

Introduction

28. We have assessed the Water Treatment proposals for the M4 CaN scheme and consider that they are clearly inadequate for the purpose of ensuring the maintenance of acceptable quality water quality on the SSSI of the Gwent Levels. We identify key points and outline our concerns below. Our submission is supported by an additional submission by a pollution expert, Professor Neil Ward.

29. The Drainage Strategy Report[1] outlines the proposals for water drainage from the proposed motorway and associated infrastructure. We note that section 1.2.1 outlines the scheme objectives and includes:

> *'c. To produce positive effects overall on people and the environment, making a positive contribution to the over-arching Welsh Government goals to reduce greenhouse gas emissions and to make Wales more resilient to the effects of climate change'*.

> It cannot be concluded that the motorway and its drainage strategy will produce positive effects overall on people and the environment. We outline our view that it will be damaging to the environment and there is a high degree of risk for the environment in this submission. Its claim that it will make a '*positive contribution to the over-arching Welsh Government goals to reduce greenhouse gas emissions'* is challenged elsewhere in our submissions.

[1] M4 CaN Environmental Statement Volume 3: Appendix 2.2 Drainage Strategy Report.

Section 2.1.2 includes a statement that the scheme:

'Would deliver principally on the following scheme objectives: Transport Planning objectives 1 and 7, Environmental Objectives Wales 2b, 4 and 8, Transport Strategy Environmental Outcomes 13 and 17.'

Environmental objective 4 states:

'Ensure that biodiversity is protected, valued and enhanced'

30. We consider that this motorway and associated drainage scheme will not deliver on this objective and we are firmly of the view that the Welsh Government's claim that the scheme will protect biodiversity is incorrect. Below we outline our case.

31. Section 4.1.2 of the drainage strategy report[2] states:

'In addition, the adopted strategy requires the surface water run-off, after attenuation and treatment, to discharge to the major NRW reens where there is a greater flow of water'

This statement is incorrect. Most of the water treatment areas do not discharge into major NRW reens where there is a greater flow of water.

32. NRW also points this out in its response to the draft Orders and ES:

4.1.2 'We welcome the proposal that discharge from the Water Treatment Areas (WTAs) to the drainage system of the Gwent Levels SSSIs will be to "major NRW reens" which we take to mean Main River. However, this intention does not appear to have been followed through to Figure 2.5, which appears to indicate some discharge to field ditches, and some to IDB reens. We would welcome clarification of this point, as this has implications for our overall view on the drainage strategy.

[2] M4 CaN Environmental Statement Volume 3: Appendix 2.2 Drainage Strategy Report.

Our strong preference for discharge to Main River reens relates to the greater dilution and dissipation capacity and also that all Main River reens discharge directly to the Severn Estuary via a tidal flap.'

33. Despite these communications from NRW the majority of the Water Treatment Areas are still listed as discharging into reens or ditches which do not qualify as 'major NRW reens'. Table 4.2, page 20 of the Water Treatment Area Risk Assessments[3] lists the outfall ditches and reens. In the table below we have listed those reens and ditches, outlined the current classification of those reens and a description of their path across the levels, to highlight the route that the outfall polluted water would normally be expected to take in non-flood conditions:

[3] M4 CaN Environmental Statement Vol 3 Appendix 16.3

Table 1: Water Treatment Area outfall reens, classifications and subsequent flow routes to the Severn Estuary

WTA	**Outfall Reen/Ditch**	**WTA Treatment no. Of stages**	**Classification of outfall reen/ditch**	**Route to Severn Estuary**
1	Pwll Bargoed Reen	3	IDB 20	Links to NRW reen 7 and NRW reen 6 – Broadway Reen.
2	Twyn-y-Bryn Reen	3	IDB 23	Links to NRW reen 7
4a	Percoed Branch Reen	Grass 4 stage	IDB35	Links to NRW 7
4b	Percoed Branch Reen	Grass 4 stage	IDB35	Links to NRW 7
5	Morfa Gronw Reen	Grass 4 stage	IDB 33/34 .	A convoluted route through St Brides SSSI. This indirect route through the SSSI none of which is main river, putting a significant number of small reens and ditches at risk from pollutants.
6	Lakes Reen	Part concrete channels (3+stage)	IDB 78	Joins Julian's Reen IDB 77 then NRW 28.
7	Julian's Reen	Grass 4 stage	IDB77	Links to NRW 28

8	Ellen Reen	Grass 4 stage	IDB68	Discharges into Chapel Reen IDB65, then into NRW 27.Chapel reen has significant ecological interest for a main river.
8a	Black Wall Reen	Concrete 3 stage	IDB 67	Discharges into Chapel Reen IDB65 then into Chapel Reen NRW 27 which has significant ecological interest for a main river.
9	Middle Road Reen	Grass 4 stage	No classificatio n?	Discharges into Elver Pill reen NRW 25, which contains some ecological interest for a main river.
10	Rush Wall South Reen This could be incorrect in the ES as it looks like Rush Wall (north)	Concrete 3 stage	IDB44 or IDB45	Leads to IDB 53, IDB 42 before finally reaching Windmill Reen NRW 22. This puts a long stretch of reen and ditch at risk of pollution before it reaches main river. If actually Rush wall north then IDB 45, IDB 52, NRW 30, NRW 21 if so is combining with WTA 9 outfall water.
11b/c	St Bride's Brook	Concrete channels 3 stage	NRW 17 Main river	St Bride's Brook flows through Magor Village. The pollutant load will increase there.
12a	Prat Reen	Concrete 3 stage	Prat Reen north	Sea wall reen north then Collister Pill Reen?

12b	Originally Vurlong Reen now amended to ditch beside Old Court Farm	Concrete 3 stage	Ditch beside Old Court Farm	No direct links to reens – north of the railway and M4. There could be a pollutant build up in this locality as there appears to be no flow. is not SSSI.

35. This table shows that 14 out of 15 outfalls are in fact **not** into a main NRW reen (main river). The only outfalls directly to a main reen are 11 b and c discharging into St Brides Brook which is classified as a NRW main river. A further 7 outfalls then pass through additional IDB (non-main river) reens before finally reaching a main river.

36. Attention has also been drawn to these problems by Mr A. R. Pickup in his response to the M4 CaN scheme. Mr A. R Pickup worked for the Caldicot and Wentlooge Internal Drainage Board as Ecological Consultant for nine years. His letter of objection states:

'By allowing motorway runoff to enter any part of the existing Gwent Levels drainage system, there is a distinct risk of serious pollution and damage to the SSSI and their features'

I have previously suggested that all the run-off from the proposed motorway should be kept completely separate from that of the existing Gwent Levels drainage system to the extent that all attenuation and treatment reservoirs should be discharged into their own channels and thence to the sea.'

I still believe, if the motorway is not to be provided with its own discharge channels to the sea, that at the very least the motorway system should be able to discharge only into main rivers and preferably only one main river on each level'

'All lagoons and conveyance channels should be on the northern side of the motorway'

'My concerns over the competence of your environmental consultants to understand the risks to the Gwent Levels drainage system and the ecological significance of their mitigation designs are considerable'

37. We thus conclude that the scheme should have been designed **from its inception** to ensure outfalls are into main reens, in order to protect the SSSI features. As this is not the case, we urge the Inspector to recommend refusal of the application. It is apparent to us that engineers have designed the scheme as they would if there had not been SSSI, to outfall to the nearest available watercourse. This approach results in outfalls to reens with less water flow than the main reens, which will ultimately increase the risk of pollutants being insufficiently diluted.

38. There is an additional problem with the proposals which relate to discharge into the Gwent Levels watercourses. This relates to the fact that many of the reens have sluices in operation which are used to keep water levels high in summer. The locations of the sluices are provided in the M4 CaN ES figure 8.3 as the set of maps titled 'Hydrology'[4].

39. It is clear from this set of maps that some sections of reen or ditch which are proposed to take the discharges from Water Treatment Areas have sluices within a relatively short distance from the outfall. In summer when the sluices are at the summer (higher) pinning level the dilution of outfall water from the water treatment areas will be severely restricted by the fact that water in the reen or ditch will have very little or no flow. Accumulation of pollutants will occur in these circumstances at these locations as will the inevitable spread of this polluted water to nearby ditches (which do not have sluices) to create a 'pool' of poor quality polluted sediments and water. The ES has provided no assessment of the impact of the pooling effect and subsequent deterioration of water quality in the reens and ditches closest to the sluices and of their likely impact on the species of rare invertebrates present in those reens. The proposed water treatment system has failed to take into account the fact that the water treatment areas are not discharging into flowing water during the summer as indeed these systems have been designed to do. We therefore consider that this is a **major deficiency, consequently urge the Inspector to recommend refusal of this application.**

40. For example both Water Treatment Areas 6 and 7 feed their outfall into Julian's reen (WTA 6 via a short section of Lakes Reen) with a sluice at location C03[5]. In addition both water treatment area 8 and 8a feed water into Chapel Reen which has a sluice at location C23[6]. Another example is Water Treatment Area 10 the outfall for which is listed as entering Rush Wall South Reen which then flows west (under normal conditions) to two sluices C53 and

[4] M4 CaN Environmental Statement Figure 8.3 Hydrology
[5] M4 CaN Environmental Statement Figure 8.3 Hydrology map.
[6] M4 CaN Environmental Statement Figure 8.3 Hydrology map.

C52[7]. The restriction of flow caused by the use of sluices on these reens during the summer would be likely to lead to a pollutant build up.

41. Some reens and ditches close to Water Treatment Area outfalls are also 'dead-end routes. In some cases, these are existing dead-end reens or ditches, for example where the channels meet the railway, and in some cases they would become dead-end reens/ditches after the M4 CaN scheme is put in place. These dead ends close to the outfalls will result in sediment deposition due to slow or no flow and a resultant build-up of pollutants.

42. There appears to have been no consideration of this problem (and the related issue of sluices) in the scheme documents and the water risk assessment forms[8] have registered the answer 'no' in the box which asks the question:

'is there a downstream structure, lake, pond or canal that reduces the velocity within 100m of the point of discharge?'

for all outfall evaluations. We consider this should have been considered and evaluated, particularly as the system is not a standard river system for which the form and risk assessment method was designed.

43. For example Water Treatment Area 4a, as illustrated on Figure 2.5 sheet 3 and 4[9] outfalls into a newly created section of ditch described in table 4.2 of the Water Treatment Area Risk Assessment as Percoed Branch East (although this appears on figure 2.5 to be drawn as a ditch not a reen). This ditch can, according to the scheme figure 2.5, flow north and west to join Percoed Reen (although the junction with Percoed Reen has not been drawn on to the map). The outfall ditch from Water Treatment Area 4a is also shown extending eastwards and joining to a minor ditch which extends as far as the railway. It would appear this is a dead end, and in any event, the slow flow or nil flow in this end of the ditch would be likely to result in contaminated sediment and pollutants building up without sufficient flow to flush out the system. We also question at this point the convoluted route of the proposed new ditch and reen system at this location as it appears over-complicated and liable to flow problems in any event.

[7] M4 CaN Environmental Statement Figure 8.3 Hydrology map.
[8] M4 CaN Environmental Statement Appendix 16.3
[9] M4 CaN Environmental Statement Volume 2 Figure 2.5 sheet 3 and 4.

44. Treatment Area 4b feeds into the same section of ditch and reen as Treatment Area 4a (through a culvert) but also has a ditch shown extending from the start of the culvert on the north side which could also result in poor flow, sedimentation and pollution buildup. We also wish to highlight that the scheme at this location is adjacent to the proposed Maerdy mitigation area, where pollution problems emanating from the railway have already been identified in responses (including NRW) to the mitigation proposals. Poor flow and further pollutant buildup could result in severe cumulative problems in the mitigation area.

45. Furthermore, the ES has not taken into account the fact that some of the reens close to these proposed outfalls have been assessed as having medium or high quality invertebrate fauna. We consider that the impact of a build up of pollutants near the sluices and outfall due to the very low flow rates (particularly in summer due to the higher pinning levels) has not been fully assessed as the HAWRAT risk assessment has assumed the same flow rate throughout all reens. The flow rate in the reens will in fact vary and in some cases will reach 0 metres cubed per second. Indeed, it has been known for ditches to flow backwards. In addition, the relative sensitivity of the specific rare invertebrate species present in the nearby reens to variable pollution levels has not been assessed and considered.

46. Reverse flow in ditches or reens is not an unusual phenomenon on the Gwent Levels. This can in part be caused by the fact that the levels are not in fact 'level' the lowest land by and large is at the inland side near the proposed route of the M4 . There appears to have been no consideration of the impact reverse flow could have on water treatment area discharges, an assessment of which outfalls would be more prone to this phenomenon, and how this might impact on dilution of the outfalls and buildup of pollutants. In addition, the risk assessment method employed by the Welsh Government does not include consideration of this problem. Although the scheme has included valves to stop flow back into the water treatment areas, the consideration of the impact of reverse flow on nearby ditches and reens is ignored. We consider this to be a significant omission.

47. We have undertaken an evaluation of the water treatment area data supplied and **we conclude that the M4 CaN scheme ES has not supplied any actual data from existing established similar scale schemes which confirms that water treatment areas can, at the scale and design proposed, provide the high water quality required to support the SSSI features of the Gwent Levels SSSI.**

48. In view of this lack of data which confirms the effectiveness of the proposed structures, we have no confidence that the water treatment areas have been demonstrated to provide water of a quality sufficient to support the SSSI features in the short term or the long term.

49. The ES states in table 5.1 in the water treatment area DMRB Risk Assessments[10] that the scheme significance of potential effects of water quality on the attribute of SSSI Biodiversity are of '**negligible magnitude' and 'neutral significance' for all 15 water treatment areas**. **We consider that the Welsh Government cannot justify or defend this conclusion.**

50. NRW states in its objection to the M4 CaN scheme:

'With respect to the Gwent Levels SSSIs, we believe that insufficient evidence has been presented in the Chapter, its supporting Appendices and elsewhere within this document (including Chapter 2 (Scheme Description) and Chapter 16 (Road Drainage and the Water Environment and their supporting Appendices to reassure us that significant adverse impacts can be avoided, both during the construction and operational phases.

The unprecedented scale of this development proposal within the Gwent Levels mean that there are too many unknowns at this stage to have full confidence that the proposed scheme construction, ways of working and mitigation can fully avoid adverse effects and therefore we are unable to agree with the conclusions of the assessment.'

NRW also refers to table 16.18[11]:

'..Linked to our comment above, we request clarification of Table 16.18, as we currently disagree with the classification of magnitude of impact as "negligible". Our view is that we have yet to have been presented with evidence that road run-off can be treated to a standard which we are satisfied is compatible with the Gwent Levels – i.e. in line with the statement made in 16.5.13 to preserve existing water quality. Again this reassurance is a key requirement for NRW in terms of our overall view and advice on whether adverse environmental impacts can be avoided.'

[10] M4 CaN Environmental Statement Volume 3 Appendix 16.3 Section 5 Conclusions table 5.1
[11] M4 CaN Environmental Statement Volume 3 Chapter 16 page 75 table 16.18.

51. The Welsh Government has not justified its conclusions in table 5.1 or table 16.18 (referred to above) with accurate monitoring data from comparable scale schemes, or with its approach to water treatment area efficiency calculations as outlined below.

52. Table 3.4a and 3.4b of the DMRB Risk Assessments document[12] provide 'typical' pollutant removal efficiencies on which these conclusions of negligible magnitude and neutral significance have been based. They are stated to be derived from HA103/06 (Highways Agency et al, 2006b) and CIRIA C609 (Wilson et al., 2004) respectively.

53. However, paragraph 3.6.2 states:

*'The values represent the typical overall performance that **could** be expected to be achieved given the high variability and site specific performance constraints that **may** be present' (our emphasis).*

54. This paragraph is effectively stating that the data cannot be relied upon for any individual site specific situation, and gives no confidence that the Welsh Government is able to predict the 'negligible magnitude' and 'neutral significance' it is purporting to be able to conclude for all 15 Water Treatment areas in the summary of Scheme Significance of Potential Effects.

55. Taking the degree of uncertainty implicit in paragraph 3.6.2, it is clear that the scheme is providing no accurate data from a scheme of a comparable scale and type.

56. Tables 3.4a and table 3.4b of the DMRB risk assessments then state typical pollutant removal efficiencies derived from HA 103/06 and CIRIA C609. These guidance documents do not offer one figure for predicting efficiencies; they give a range, for example from 60-100% for efficiency is given as 'typical' for TSS/suspended heavy metals in swales (HA 103/06). For removal of heavy metals in solution the HA 103/06 guidance (table 3.4a) gives a range of 30-100% efficiency for removal of heavy metals in solution in swales, infiltration basins and SF wetlands, 0-30% efficiency for balancing ponds, and 0-60% efficiency for sedimentation ponds. In Tables 3.5a, 3.5b and 3.5c, the M4 CaN scheme has then given 'indicative' efficiencies of proposed M4 CaN scheme treatment trains. There is no verification documentation given as to how these figures can be relied upon as actual efficiency rates for the M4 CaN scheme.

[12] M4 CaN Environmental Statement Volume 3 Appendix 16.3

57. These figures appear to have been based on average efficiencies, and there is no clarification as to how they were derived.

58. There can be no guarantee that the scheme proposed for the M4 CaN will by some accident represent the average efficiency derived from the data provided from HA 103/06. Indeed, it could easily represent only 60% efficiency for TSS/suspended heavy metals in solution in swales, or as the proposed system is 'bespoke', it could represent less than 60%, as there is no evidence provided that a scheme of comparable scale and design has been tested elsewhere.

59. We thus consider that there is no guarantee that these stated efficiencies will be achieved.

60. The M4 CaN scheme (Table 3.5a) then evaluates the scheme assuming an efficiency of 75% for dissolved heavy metals in grass lined channels, 65% for the detention basin, 30% for the sedimentation pond and 80% for the reedbed. Given the guidance given in HA103/06 and CIRIA C609, (Table 3.4a) actual efficiencies achieved could be as low as 30% in the case of dissolved heavy metals in solution, in swales, infiltration ponds and SF wetlands, as low as 60% in SSF wetlands and as low as 0% efficiency in balancing ponds and sedimentation ponds. It is important to note that these low figures would also be subject to the 'drainage system being properly installed and maintained' (section 3.6.3).

61. Table 3.6a (page 14) then presents the cumulative treatment efficiencies derived. However, the numerical figures used clearly do not present the 'worst case' scenario for efficiency.

62. This is just one example but the pattern of taking average efficiency estimates into the risk assessment is applied to all pollutant types in the tables. This approach leaves the designated SSSI at high risk of significant adverse impacts from poor pollutant removal efficiencies.

63. The DMRB Risk Assessment Section 4.5.4 states:

64. *'From inspection of Tables 4.1 and 4.2, it is apparent that reen baseline concentrations for key heavy metal and organic pollutants are significantly below EQS/PNEC and DMRB RST compliance criteria where prescribed.* ***In***

addition to the minimal in-reen dilution that can be expected at each WTA outfall for treated runoff, it can be reasonably concluded that departures from existing baseline quality can be expected.'

65. The first sentence is we consider, very misleading as there are numerous examples of exceedances in the reens. The data Table 4.1 has combined all data for the reens and provided mean data which does not illustrate clearly those exceedances. Table 4.2 has selected only one sample point to assess each Water Treatment Area and in doing so, in some notable cases, has not selected sample points for subsequent data analysis near the proposed outfall which show high baseline levels of pollutants.
66. This statement contains the following key admission, viz that: '**departures from baseline quality can be expected**'
67. This is effectively admitting that pollution in the reens would increase compared to the baseline.
68. The scheme admits uncertainty as to the impacts of water quality changes in relation to the SSSI conservation objectives in Vol 1 Chapter 16 section 16.5.13:

*'given the **acknowledged high uncertainty** regarding the effect of changes in water quality in relation to the conservation objectives of the Sites of Special Scientific Interest, the scheme has aimed to preserve existing water quality within the reens'*

69. Yet the scheme provides no certainty regarding water treatment efficiency, and assumptions of average efficiency are misleading. To then conclude in Table 5.1 in the water treatment area DMRB Risk Assessments[13] that the scheme significance of potential effects of water quality on the attribute of SSSI Biodiversity are of '**negligible magnitude' and 'neutral significance' for all 15 water treatment areas**' is in our view very incorrect, and significantly underplays the adverse impacts which would be likely to arise.

70. This is not the only example in the pollution and water drainage and treatment sections of the ES that average figures are derived for the purposes of assessment. For example, monitoring data for the reens in table 4.2[14] Water Treatment Area outfall reen ABC and RST concentrations. This table contains mean data for pollutants such as copper, zinc, cadmium, mean PAH and mean chloride in the Water Treatment Area outfall reens. **We must be clear here that it would only take one significant pollution event to cause major ecosystem damage in the reen system**. If the figures for existing pollutants in a reen are averaged over a year then it may appear there is no problem. Yet

[13] M4 CaN Vol 3 Appendix 16.3 Water Treatment Area DMRB Risk Assessments
[14] M4 CaN Vol 3 Appendix 16.3 Water Treatment Area DMRB Risk Assessments page 20 table 4.2

one high 18 exceedances during that period may have caused long-term damage to the ecosystem. We note that NRW has raised its concern over this issue in its objection response to the M4 CaN scheme:[15]

'*We also note that 'average levels' and 'ranges' are provided. This data is of limited use in interpreting water quality data trends with respect to the SSSIs. All data from samples must be viewed independently as this is the only way to ensure exceedances of contaminants can be identified. In particular, when water quality during both construction and operation phases.'*

71. In relation to the point above, we wish to challenge this approach of averaging pollutant figures for analysis. We wish to draw attention to Planning Inspectorate Advice Note 9: Rochdale Envelope, which states that in such assessments, the worst case scenario should be employed. This approach is failing to address a 'worst case' impact of pollutants by removing extreme event figures in the data analysis, the very events which would be so damaging to wildlife and invertebrates in the reen system.

72. We note that the **maximum** depth of the proposed grassed channels appears to be 0.8m deep near the outfall points[16] and shallower elsewhere. Where a contributing impermeable area of 15.8 ha is involved (Water Treatment Area 9), we take the view that the scheme has provided no evidence which proves that overtopping of grassed channels will not occur, and is even more likely to occur if rainfall results in debris, grass cuttings and rubbish gathering at any point where vegetation is thicker or protruding. We understand that the grassed channels will be lined to stop infiltration into the substrate below. In the case of overtopping during an intense period of summer rainfall after dry weather (e.g. local 'flash flood' conditions) a high concentration of pollutants are likely to be present during this event. This is because it is well understood that during dry weather pollutants build up on the dry surfaces on the road and a heavy and sudden rainfall event washes off a much higher pollutant load than when rainfall is frequent. Even a small buildup of rubbish or debris in the grassed channel could contribute to overtopping of heavily polluted water in this circumstance. Referring to Section 2.1.14 of the Water Treatment Areas DRMB Risk Assessments, it would appear from the inset diagram the **polluted water in the grassed channel is less than a metre (horizontal distance) from the edge of the embankment in this 'typical' section on the Gwent Levels.** In an over-topping event, polluted water would run down the embankment and flow directly into the newly-created reens which are linked to the whole SSSI reen system with **no additional and immediate pollution control in place.**

[15] NRW Objection response page 83 paragraph 3.
[16] M4 CaN Vol 3 Appendix 16.3 Water Treatment Area DMRB Risk Assessments section 2.1.11

73. We take the view that the M4 CaN scheme has given inadequate consideration to the risk of overtopping of the grassed channels which are located only 1 metre from the edge of a low embankment next to SSSI and has not presented to the inquiry any information to explain why it has not addressed the risk of overtopping. It is clear to us that there would be no method by which polluted water could be stopped once spilling down the embankment into the new reens a few metres away in a sudden storm event. During storm conditions, multiple flows down the embankment could lead to multiple pollution impacts on the SSSI, contingency emergency procedures would be too slow to stop the almost immediate impacts. The same almost immediate pollution of the reen system could also occur in the event of a road accident where vehicles leave the carriageway. These issues put the SSSI system at additional and significant risk from pollution.

74. Section 3.6.3 of the Water Treatment Area DMRB Risk Assessments states:

'the efficiencies cited in this assessment are subject to the drainage systems being properly installed and maintained'.

75. We are concerned that there can be no guarantee given by the Welsh Government that the water drainage and treatment system will be properly maintained in the long term and as such the risk of elements of poor maintenance resulting in significant SSSI damage cannot be ruled out. The Gwent Levels SSSI will therefore be **permanently** at a higher risk of pollution as a result of the scheme being implemented. We refer you to Prof Neil Ward's submission which highlights the M4 CaN descriptions of maintenance and monitoring are inadequate and outlines problems with existing schemes[17]. Examples of how easily maintenance issues could affect efficiency include the following:

- Mowing frequency in grass lined channels can be a very important factor for efficiency. If the grass is too long, it will tend to flatten during heavy flow, significantly reducing filtration.

- No indication is given that grass cuttings in the grass channels would be removed off site. If grass cuttings are left they may either create a carpet of dead material which kills the grass where the cuttings collect in a layer, or will be washed along the channel taking absorbed pollutants on to the next stage, in both these cases the result would be reduced efficiency. Grass cuttings are likely to collect in a thicker layer in lowest part of the channel profile, thereby reducing efficiency in most rain events.

[17] Gwent Wildlife Trust M4CaN Written Statement by Prof Neil Ward 2/2/2017

- It is indicated that remote control mowers would be used. Technical problems or stolen mowers could delay management, reducing efficiency.

- Settlement of soils and material in the embankment could cause the channel to flow intermittently with pooling. This could reduce grass growth required for filtration efficiency in wetter sections and make mowing difficult, especially with remote control devices.

- The channels are lined with a grass surface. Storm flow could result in scouring of grass and soil. The layer of soil is thin. Any scouring can result in bare patches with considerably reduced filtration.

- Litter build-up in the channel could interfere with filtration and kill grass.

- It must be remembered that the water treatment areas are **collecting** pollutants. The pollutant load in the system will build up and a higher pollutant load in the outfall water is inevitable unless a regular programme of sediment and plant cutting removal is undertaken. Please also refer to Prof Neil's comments on maintenance issues[18]

76. During storm conditions the grass channels will fill with water to the point that water is flowing above the vegetation height. At this point the efficiency of pollutant removal would be significantly reduced. This is likely to result in burst of higher pollutant levels flowing through the system. Once in the reedbed the same problem can arise, once water is reaching the top of the soil level and flowing freely over it, very little filtration is achieved. As stated above, summer storm conditions would exacerbate this scenario as dry roads prior to the storm will have built up increased pollutant loads. These conditions will result in a significant peak level of pollutants reaching the outfall into the SSSI reens. This peak will have a much more damaging impact on the ecosystem and invertebrates in the reens and ditches, particularly those close to the outfall. The risk assessment has not provided specific assessments of these conditions to demonstrate they have looked at a worst case scenario in terms of impacts on the SSSI flora and fauna. The worst case scenario could result we believe in a rapid change in the chemical balance

[18] Gwent Wildlife Trust M4CaN Written Statement by Prof Neil Ward 2/2/2017

and pollutant loads resulting in the death of pollution sensitive species. These intermittent bursts of higher pollutant levels can result in long term damage to the ecosystems of the SSSI, and the impact will not affect all species equally due to variations in pollution sensitivity.

77. The scheme has not offered information which demonstrates that the water treatment systems at the scale proposed, have been tested in SSSIs in a similar situation to the Gwent Levels. No assessment or document has been provided to demonstrate that the inevitable **variable** pollutant outputs will not have a detrimental impact on the rare species assemblages of the Gwent Levels SSSI, as the testing approach is based on assumptions of average performance and assumptions of a flow rate in receiving reens which is not variable. In addition, there is no evidence provided that the specific rare invertebrate species on the Gwent Levels can cope with these fluctuations. No guarantee can therefore be given that the scheme will not have adverse or large adverse impacts during operation. In particular, some rainfall events can result in significantly raised pollution outputs into the system which have the potential to cause species kills. We therefore do no concur with the conclusion provided in the M4 CaN Environmental Statement Appendix 16.3[19] that the impacts of the scheme on water quality for attributes of SSSI biodiversity for which the quality and importance is identified as important and very important respectively, will have a **negligible** magnitude and a **neutral** significance. The evidence provided to support this conclusion is insufficient.

78. We wish to draw attention to the forms completed for the Water Treatment Area DMRB Risk Assessments, using the Highways Agency Water Risk Assessment Tool, Version 1.0 2009, which are provided in Appendix 16.3. We wish to highlight that the forms are clearly designed for run-off into rivers (reference 'river impacts' step 2). The risk assessment data form has therefore not been designed for man-made reens and ditches, and as such the input of data from the reens/ditches would be likely to result in the outputs from the risk assessment tool being misleading or unreliable. For example, all forms answer the question in step 2: 'is there a downstream structure, lake or canal that reduces the velocity within 100m of the point of discharge? All forms enter 'no' in this box. Yet the system of reens and ditches involves sluices which do in fact reduce velocity and the scheme includes some dead-end ditches and reens which would also act to slow and stop flow. Water flowing up ditches close to the outfall may also pool in places. The answer 'no' in this box for all reens and ditches is thus incorrect.

[19] M4 CaN Environmental Statement Volume 3: Appendix 16.3 section 5 page 27 Conclusions

79. The Step 2 river impacts: river flow has been given as the same for all reens and ditches at 0.0005 cubic metres per second. We note in the revised Water Treatment Area Risk Assessment (appendix SS16.1) that flow rates have been amended to 0.00001 cubic metres per second to calculate sediment deposition. However, flow rates in each reen and ditch would not be constant, nor is it likely to be identical. See also the reference to reverse flow below. We are concerned that the replacement set of DRMB Risk Assessment forms has not been provided by the Welsh Government in the revised DRMB Appendix SS16.1, despite reference to amendments. It is possible to ascertain exactly how they have been amended and which impacts have been reassessed. **We therefore require that a revised set of DRMB forms is provided for our perusal (and others'), consideration and subsequent response.**

80. We note that individual ditch and reen sizes were subsequently considered in the revised risk assessment in relation to sediment deposition (previously all outfall reens and ditches were assumed to be the same size). However, the full data sheets have not been made available, as referred to above> It is important that GWT (and others) can gain a full appreciation of exactly how many of the risk assessment elements have been recalculated.

81. It is also apparent that the apparently 'averaged' estimates of treatment efficiency (see above point 8) have been inputted into step 3, thereby the 'worst case' scenario of poor treatment efficiencies have not been addressed in the risk assessment.

82. We are concerned that several outfalls from the M4 CaN scheme feed into the same reen, for example WTA 6 and 7 feed in to Percoed Reen and WTA 8 and 8(a) both feed in to Chapel Reen. The forms indicate under assessment type that they have been completed as a 'non-cumulative assessment (single outfall)'. We therefore conclude that the risk assessment full cumulative impact of road pollution on Percoed Reen and Chapel Reen has not been assessed. This also applies to other reens in the system where multiple WTA's feed in to the network.

83. We wish to draw the attention of the Inspector to the fact that the Gwent Levels have existing pollution problems, primarily resulting from industry, development and farming on and in the vicinity of the Gwent Levels. These levels of pollutants are extremely variable. We highlight that a number of pollutants have exceeded WFD quality standards on the Levels.

84. We wish also to draw attention to the fact that the analysis of baseline pollution levels in the reens and ditches has used **average** concentrations for input into the analysis and risk assessments. This is not presenting the 'worst case' scenario for consideration of the impacts (see above point). Input of average concentrations will result in the environmental assessments failing to predict potentially damaging pollution levels which will occur within the full range of results already recorded in the reens. The ecosystems in the reens only need one bad pollution incident to cause long term/catastrophic damage.

85. The variation of pollution levels across the Levels also means some locations are at higher risk of **multiple** pollutant risk. For example, RPS Monitoring Station 11.1 has recorded a concentration of 31.9 ug/l Isopropyltoluene (Annex H).

86. The Tata Steelworks land has repeatedly been shown to have elevated levels of a number of pollutants, and these higher levels are also picked up in reens to the south of the site, due to previously developed contaminated areas. No specific analysis has been included in the ES, to demonstrate the in combination impacts of higher pollutant loads in the vicinity of the steelworks site with pollutants predicted for adjacent outfalls from WTA 8, WTA 8a, and WTA 9. For example, sample location RPS 17.3 on Elver Pill Reen shows elevated levels of Cadmium at 0.436 ug/l, Selenium at 6.22 ug/l, Arsenic (dissolved) at 3.02ug/l and Chloride at 785mg/l (the highest recorded chloride level in the data set). WTA 9 is designed to feed its outfall directly into Middle Road Reen which then feeds into Elver Pill Reen, therefore cumulative pollutant impacts are likely. We would like to question why this sample point 17.3 was only tested once during the baseline assessment, despite its worryingly high pollutant levels. We wish to question why this sample point showing high pollution levels was excluded from further sampling (or alternatively the data from this point was not included in the analysis).

87. There appears to be a significant issue in the data on Table 4.2. It lists WTA 9 feeding in to Middle Road Reen Diversion. This is correct. However, it then lists the relevant sample point as 17.1. It appears the data from sample point 17.1 has indeed been used for the analysis, but unfortunately the map in appendix 16.2 RPS surface water monitoring locations 2015/2016 shows that monitoring point 17.1 is not on Middle Road Reen diversion, it is on 100 Perches Reen to the north. This location sample point is less likely to display the higher baseline pollutants from the steel works land. Several other sample points are in more appropriate locations to assess the impact of baseline levels and WTA 9 outfall impacts, including RPS 17.2, RPS 17.3, R15 or SW507. If we take RPS 17.2 as the correct

one, this shows elevated levels of chloride from its two samples at 248 and 60.4mg/l, this gives a mean figure of 154.2mg/l this compares unfavourably with the mean figure used for sample point 17.1 at 30.30 mg/l. Point R15 shows no elevation in chloride levels, at 21, 28, 38 and 21 mg/l, but this sample point is also to the north of the proposed water treatment area. Sample point SW507 (Hyder) shows elevated levels of chloride at 210, 250 and 320mg/l with a mean figure of 260mg/l.

89. High levels of zinc well above the WFD EQS level of 41.5 ug/l and the PNEC (predicted no effect concentration) of 41.7 ug/l[20]have been recorded at the following locations:[21]

M4 CaN Baseline Monitoring Zinc EQS and PNEC exceedances

Monitoring Location	**Zinc ug/l total,unfiltered**	**Location of zinc exceedance**
RPS 4.2	174	Nant y Moor reen feeds into Percoed reen
RPS 7.4	61.6	Morfa Gronw reen WTA 5
RPS 13.1	45.3	Julian's reen WTA 7
RPS 14.1	75.8	Ellen Reen WTA 8
RPS 14.1	54.1	
RPS 14.2	106	Chapel reen fed by WTA 8 and 8a south of steelworks
RPS 16.1	55.9	IDB 64 Monks reen south of steelworks
RPS 18.1	75.8	IDB 45 Rush Wall reen? - WTA 10 outfall
RPS 20.1	57.8	Europark close to steelworks road
TITAN R4	42	Percoed reen WTA 4/4a
TITAN R5	260	Morfa Gronw reen WTA 5
TITAN R8	43	Lakes reen WTA 6
TITAN R9	65	Julian's reen (outfall from WTA 7)
TITAN R9	45	
TITAN R9	260	
TITAN R10	160	Ditch close to Ellen reen?

[20] M4 CaN Environmental Statement Vol 3 Appendix 16.2 page 12 table 2.3
[21] M4 CaN Environmental Statement Vol 3 Appendix 16.2 Annex H

TITAN R10	210	
TITAN R11	81	Ellen Reen WTA 8 outfall south of steelworks
TITAN R11	79	
TITAN R11	50	
TITAN R11	360	
TITAN R12	43	Black wall reen WTA 8a outfall edge of steelworks
TITAN R12	42	
TITAN R14	52	Elver Pill reen, south of steelworks
TITAN R15	99	Europark
TITAN R15	42	
TITAN R15	310	
TITAN R18	43	Beside steelworks road, Europark.
TITAN R21	49	Llandervenny Reen close to steelworks road
TITAN R22	75	Not located on Figure 8.3 omission?

90. It is important to note that all these sampling locations were chosen to align with the route of the proposed M4 Black Route, and as such reflect existing exceedances close to or under the proposed route, and also have been chosen to be close to the proposed WTA outfalls.

91. The M4 CaN Baseline Water Environment Report Annex H contains a summary table which confirms these exceedances, highlighting that 30 sample locations exceed the EQS for total ug/l unfiltered zinc. We note that no analysis of the impact of these exceedances in combination with the M4 CaN is provided. As highlighted in the DRMB Risk Assessments, zinc pollution is a key consideration in the water treatment proposals, but no cumulative impacts have been considered, despite the exceedances as outlined in the table above. The M4 CaN scheme, in combination with existing pollution levels and incidences, would be likely to have devastating impacts on the water quality and ecosystems of the Gwent Levels.

92. We note that the M4 CaN Water Treatment Area DRMB Risk Assessments Table 4.2 has chosen to display mean zinc (dissolved) figures only, and has not included figures for total zinc. If they had done so, this table would have had to display exceedances in the table.

93. It is important to note from these data that certain reens which have been chosen for WTA outfalls are already experiencing exceedances of the EQS for zinc. These are: Percoed Reen (WTA 4/4a), Morfa Gronw Reen (WTA 5), Julian's Reen (WTA 7), Ellen Reen (WTA 8) Chapel Reen (fed by WTA 8 and 8a), Rush Wall Reen (WTA10). These locations largely reflect where industry, lorry depots and roads are feeding zinc-contaminated water into the reens. Inevitably these zinc levels fluctuate with weather conditions and rainfall events. The locations are predominantly around Europark, the Steelworks, and industrial estates to the south east and south west of Newport, with possible inflow of contaminated water from the southern distributor road and existing M4.

94. We are particularly concerned regarding the area around Europark and the eastern end of the steelworks site. This area is experiencing a range of existing pollution issues, some of which have been severe, but recent monitoring by RPS seems to have failed to include sample locations which reflect this problem area, and have chosen to provide no assessment of cumulative impacts evaluating existing pollution in the reens and the impact of water treatment area 9 in this location.

95. In addition the table 4.2[22] shows that only one baseline monitoring station has been used for the risk assessment analysis of each WTA. This sample point has provided a maximum of 6 samples and in some cases for example point 7.1 on Morfa Gronw Reen only 3 samples for the analysis (evidenced on the Annex H updated table). It must also be noted that some sample analysis datasets omit some chemicals so data for any one chemical may not offer a complete set. This is inadequate considering the risks associated of multiple SSSI damage if the WTA outfalls result in cumulative effects in combination with baseline conditions.

96. We conclude from this that despite potential cumulative impacts of zinc concentrations at locations along the M4 CaN route, the analysis has taken mean levels, has not considered the data from more than one sample location taken near outfalls for each risk assessment (despite data being available for nearby sample points) and has ignored

[22] M4 CaN ES Volume 3 Appendix 16.3 Water Treatment Area DMRB Risk Assessments Table 4.2 page 20

sample locations which may demonstrate elevated existing levels of pollutants near outfalls, despite it being clear this could cause significant adverse cumulative impacts.

97. It is further clear that other toxic chemicals will also create cumulative impacts for which a full and thorough analysis has not been undertaken for this ES.

99. Furthermore, we draw attention to the fact that **ground water** in the vicinity of the M4 CaN scheme is also already experiencing raised levels of some pollutants. Chapter 16 Road Drainage and the Water Environment provides a summary of existing ground water pollution.[23] We wish to highlight that a range of pollutants are present in the groundwater, including arsenic, boron, chromium, nickel, selenium, petroleum hydrocarbons, chloride, sulphate, lead, mercury, copper and zinc.

100. The common occurrence of metals in ground water represents anthropogenic sources[24]. Although the specific source is not known, historic and current heavy industry in Newport, the Llanwern Steelworks site and road related pollutants are considered the main culprits. It is clear from this section of the report that drinking water standards are frequently exceeded. The Environmental quality standards (EQS) are also exceeded in bedrock samples including exceedances of mercury in 25.9% of bedrock samples, and exceedances of copper, nickel, and mercury in 26%-43% of samples.

101. We wish to question why the evaluation of cumulative impacts has failed to provide a thorough assessment as to whether the scheme could add further to existing groundwater exceedances. For example, the proposal to bury steelworks material under the M4 CaN embankment,[25] (a site well-documented as having high pollution levels) is likely to add to both surface and groundwater pollution levels in the area and is placing the SSSI at greater risk. If any problems result from the reuse of this material it would be impossible to subsequently remove the material which would be buried under the motorway. It would appear to us to be a cost cutting exercise designed to avoid having to remove the material to a permitted site elsewhere.

102. The Proposed Reuse of Contaminated Steelworks Material under the M4 CaN - In relation to concerns about additional pollution risks, we wish to draw attention to the proposed use of contaminated steelworks related material under the proposed M4 can scheme. Although we have not been able to undertake a full analysis of this issue, we wish to highlight that reusing steelwork contaminated material under the motorway is another potential pollutant risk in an already complex situation with existing and additional pollution issues resulting from the M4 CaN scheme. We wish to highlight that if pollutants should start to leach out from the material it would clearly be extremely difficult to remove them from under the motorway. We are aware of a number of research papers which provide research material which relates to these types of risks. These can be supplied as an addendum. We wish to request that a thorough risk assessment for this proposal is undertaken. In our view it may be one risk too many for

[23] M4 CaN Scheme Volume 1 Chapter 16 pages 40-43
[24] M4 CaN Scheme Volume 1 Chapter 16 page 40 section16.4.71
[25] M4 CaN Scheme Volume 1 Chapter 16 page 110 section 16.5.5

the Gwent Levels SSSI. We would take the view that the material should instead be removed to an appropriate disposal site.

Conclusion:

103. We conclude that the water treatment proposals and water treatment risk assessment have not presented the 'worst case' in its assessment of water treatment efficiency and likely impacts on the SSSI reen system, and in doing so has not properly assessed the 'worst case' impacts on the suite of SSSI.

104. The Rochdale Envelope arises from two cases: R.v Rochdale MBC ex parte Milne (No.1) and R v Rochdale MBC ex parte Tew [1999] and R v Rochdale MBC ex parte Milne (No. 2) [2000].

105. The key propositions set out by the judge in Milne (no. 2) include the following:

106. '*The assessment may conclude that a particular effect may fall within a fairly wide range. In assessing the 'likely' effects, it is entirely consistent with the objectives of the Directive to adopt a cautious 'worst case' approach. Such an approach will then feed through into the mitigation measures envisaged.... It is important that these should be adequate to deal with the worst case, in order to optimise the effects of the development on the environment' (para. 122 of the Judgement)*'

107. Advice note nine also states on page 7 para 1 of the text:

108. '*In the course of preparing the ES a developer should seek to identify those aspects that are likely to give rise to significant adverse impacts, such that the maximum potential adverse impacts have been properly assessed*'

109. We are firmly of the view that the M4 CaN Water Treatment Area DMRB Risk Assessments have failed to assess the maximum potential adverse impacts of the scheme and the ES is therefore deficient inadequate. The conclusions given in the ES concerning mitigation and compensation are therefore invalid.