highways england

European Union
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A30 Chiverton to Carland Cross
TR010026

6.5 STATEMENT TO INFORM AN APPROPRIATE ASSESSMENT APPENDIX 2 INTEGRITY MATRICES

Planning Act 2008

APFP Regulation 5(2)(g)
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

A30 Chiverton to Carland Cross
Development Consent Order 201[x]

6.5 STATEMENT TO INFORM AN APPROPRIATE ASSESSMENT APPENDIX 2 INTEGRITY MATRICES

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2 Integrity Matrices

2.1 Stage 2 Effects on Integrity

2.1.1 Likely significant effects have been identified for the following sites:

- Newlyn Downs SAC (Matrix 5)
- Breney Common and Goss and Tregoss Moors SAC (Matrix 6)

2.1.2 These sites have been subject to further assessment in order to establish if the NSIP could have an adverse effect on their integrity. Evidence for the conclusions reached on integrity is detailed within the footnotes to the matrices below.

Table 2-1 Matrix Key

Report Table Heading – (Navy, Bold 10.5)	Report Table Heading
✓	Adverse effect on integrity **cannot** be excluded
✖	Adverse effect on integrity **can** be excluded
C	construction
O	operation
D	decommissioning
a.	footnotes provide the text to explain the assessment in full including the justification for the conclusions on whether an adverse effect on the integrity of the site can/cannot be excluded at Stage 2: Appropriate Assessment.
	where effects are not relevant to a particular feature

Table 2-2 HRA Integrity Matrix 5: Newlyn Downs SAC

Name of European site and designation: Newlyn Downs SAC																		
EU Code: UK0030065																		
Distance to NSIP: 35m to site boundary and 180m to main carriageway																		
European site features	**Likely effects of NSIP**																	
Effect	1) Change in air quality			2) Change in water quality			3) Changes in hydrology			4) Inappropriate management and alien introductions			5) Reduced management of the site			6) In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix*	×*o*			×*p*	×*q*		×*r*	×*r*		×*s*						×*t*	×*t*	
European dry heaths	×*o*			×*p*	×*q*		×*r*	×*r*		×*s*						×*t*	×*t*	

Evidence supporting conclusions

Changes in Air Quality

o: Impacts on air quality arising from construction activities

2.1.3 **Ecology and nature diversity** (Volume 6 Document Ref 6.2 ES Chapter 8) states that in the case of the Newlyn Downs SAC:

"where vegetation may be sensitive to elevated levels of airborne dust from the works and nitrogen deposition during both construction and operation of the road. Best practice control measures will be required to reduce this risk".

2.1.4 Therefore prior to mitigation a likely significant effect could not be excluded at the screening stage.

2.1.5 The IAQM guidance on the assessment of dust from demolition and construction (IAQM, 2014) states that during construction the "most common impacts are dust soiling and increased ambient PM10 concentrations due to dust arising from activities on the site". It goes on to set out the approach to assessing the risk of effects from construction dust. The first stage of the process is to screen the requirement for a more detailed assessment based on the distance between the ecological site and the construction works. The IAQM guidance then states that "Where the need for a more detailed assessment is screened out, it can be concluded that the **level of risk is "negligible", and any effects will be not be significant".**

2.1.6 The IAQM Screening criteria state that an assessment will normally be required where there is an 'ecological receptor' within:

- 50 m of the boundary of the site; or

- 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

2.1.7 The guidance states that this *"step is deliberately chosen to be conservative, and will require assessments for most schemes. The distances cited here, and in subsequent sections, take account of the exponential decline in both airborne concentrations and the rate of deposition with distance, as well as practical experience of members of the Working Group".*

2.1.8 Site Entrances are not defined at this stage, however applying a 500m buffer around the construction compounds, the are no areas on the public highway and within 500m of the construction compounds that come within 50m of the European site, therefore tracking impacts are not indicated to be an issue.

2.1.9 Construction traffic for any delivery of new materials to site will primarily use the existing A30 but will access the construction site and compounds off the associated side roads including the A390, B3284, A39, Allet Road, Shortlanesend Road and Pennycomequick Road. None of these side roads are located in the vicinity of the European site.

2.1.10 Airborne pollutants are identified as a threat to the qualifying habitats[1] present at the European site. At its closest point, the European Site is located approximately 35m from the site boundary. However, the area of the proposed works located 35m from the site boundary is currently arable/improved grassland, and is included within the site boundary due to proposed heathland restoration in this location, as a part of the scheme. Therefore, no significant dust generating activities will be occurring in this area. When excluding the land identified for heathland regeneration the proposed development is located approximately 105m from the European Site at its closest point. This is illustrated in Figure 1. Therefore, applying the threshold of 50m established through the IAQM guidance, it can be concluded that **the level of risk to the European site is "negligible**".

[1] http://jncc.defra.gov.uk/pdf/Article17Consult_20131010/H4020_UK.pdf

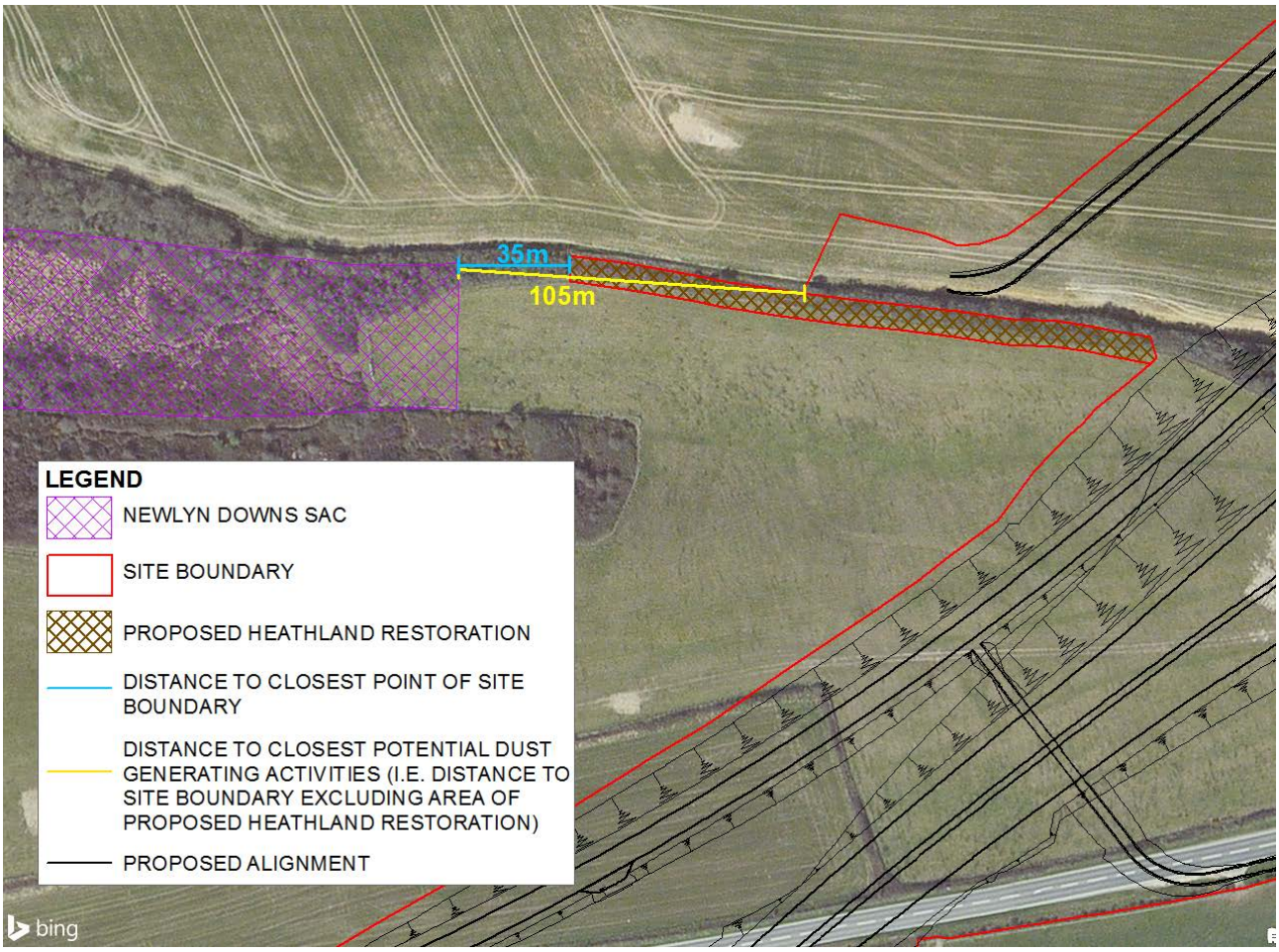

Figure 1: Distance between Newlyn Downs SAC and site boundary

2.1.11 Furthermore, best practice mitigation measures will be implemented through an Air Quality Management Plan, as outlined in the **Outline CEMP** (Volume 6 Document Ref 6.4 ES Appendix 16.1), to minimise effects from construction dust and will be incorporated into the scheme CEMP. The Outline CEMP includes the following requirements and will be secured by Requirement 3 in the **Draft DCO** (Volume 3 Document Ref 3.1):

- The main contractors will plan the site layout to locate machinery and dust-causing activities away from sensitive receptors, where reasonably practicable
- The main contractors will also use appropriate methods, such as the erection of hoardings or other barriers along the site boundary, where appropriate, to mitigate the spread of dust to any sensitive buildings or other environmental receptors
- Measures will be implemented by the main contractors to limit emissions during construction, as set out in **Outline CEMP** (Volume 6 Document Ref 6.4 ES Appendix 16.1), Annex 2 Section 17.14-17.20 in respect of:
  - construction plant and vehicles
  - transportation and storage of materials
  - construction plant and vehicles
  - demolition activities
  - excavations and earthworks activities
  - drilling activities will include the following
  - processing, crushing, cutting and grinding activities

2.1.12 Based on the distance between the European site and the site boundary of the proposed development, along with the measures set out in the CEMP, it can be concluded that the level of risk is "negligible". Therefore, in view of the site's conservation objectives **an adverse effect on the integrity of the European site can be excluded.**

Change in water quality

p: Impacts on surface and groundwater quality during construction

2.1.13 The ES **Road Drainage and Water Environment** chapter (Volume 6 Document Ref 6.2 ES Chapter 13) identifies one surface water receptor in proximity to the scheme that that flows northwards through the SAC. The watercourse is located at approximate Chainage 12+900, 220m north of scheme alignment and running along the eastern boundary of the European Site for approximately 350m (See Volume 6 Document Ref 6.3 ES Figure 13.). This is the only identified surface water connection between the scheme and the European site.

2.1.14 The ES **Road Drainage and Water Environment** chapter (Volume 6 Document Ref 6.2 ES Chapter 13) states the following in respect of potential impacts on surface water:

*"The **Outline CEMP** (Volume 6, Document Ref 6.4, ES Appendix 16.1) includes best practice measures for the storage of hazardous substances, the siting of higher risk activities (e.g. vehicle washdown areas) and the maintenance of plant. Following the implementation of these practices, the magnitude of any accidental spillage or temporary physical modification as a consequence of the scheme is likely to be negligible."*

2.1.15 And in respect of effects on groundwater quality it states that:

*"Following the implementation of mitigation required by the **Outline CEMP** (Volume 6, Document Ref 6.4, ES Appendix 16.1), the magnitude of any pollution incident is likely to be negligible. Therefore, the significance of effect would be neutral."*

2.1.16 The relevant mitigation is set out in Annex G: Ground and Surface Water Management Plan and Annex H: Pollution Prevention and Control Management Plan, in the **Outline CEMP** (Volume 6 Document Ref 6.4 ES Appendix 16.1). The Outline CEMP includes the following requirements and will be secured by Requirement 3 in the **Draft DCO** (Volume 3 Document Ref 3.1):

- Application of standard measures based on the Environment Agency's Pollution Prevention Guidelines (PPGs).
- Additional site-specific measures would include:
  - A surface water management system using measures such as temporary silt fencing, cut off ditches, settlement ponds and bunds set up early in the construction period to capture all runoff and prevent ingress of sediments and contaminants into existing drainage ditches where necessary.
  - Water with a higher risk of contamination which requires discharge, including groundwater pumped out of pilings during concrete pouring, would be contained and treated using appropriate measures such as coagulation of sediments, dewatering and pH neutralisation prior to discharge. There are various proprietary package treatment plants available that can provide these measures.

- Contaminated water that cannot be treated on site would, if necessary, be pumped to a suitably licenced tanker before being exported off site for treatment at an appropriately permitted facility.
- Areas of exposed sediment deemed at risk of erosion during heavy rainfall or flood inundation should be protected using either temporary measures (e.g. sheeting) or semi-permanent measures (for example coir matting) until vegetation is able to establish on these surfaces.
- Works would be suspended during out-of-bank river flows or during intense rainstorms.
- A water quality monitoring programme prior to and during construction works would be agreed with the EA.

2.1.17 Taking into account the negligible magnitude of any spillage or pollution event, the distance of the SAC from the scheme, and in view of the site's conservation objectives, **an adverse effect on the integrity of the European site can be excluded.**

q: Impacts on surface water quality during operation

2.1.18 The anticipated flow during summer months within the attenuation basins is likely to have a Q95 (the flow that is exceeded 95% of the time) of less than or equal to 0.0013m3/s and would therefore discharge to groundwater. Thus, the 'first flush' discharge into attenuation ponds and infiltration from the ponds results in little discharge entering the watercourse.

2.1.19 The locations of the outfalls and water bodies are illustrated in **Surface Water Features and Existing Flood Risk** (Volume 6 Document Ref 6.3 ES Figure 13-1) and **Proposed Highways Drainage Catchments** (Volume 6 Document Ref 6.3 ES Figure 13-2).

2.1.20 Existing highway runoff is likely to discharge uncontrolled into field ditches and adjacent watercourses, and therefore the proposed drainage system with the scheme is likely to represent an improvement on the current discharge quality for the existing A30.

2.1.21 The ES **Road Drainage and Water Environment** chapter (Volume 6 Document Ref 6.2 ES Chapter 13) documents the approach to and outcome of Highways Agency Water Risk Assessment Tool (HAWRAT)[2] modelling, which has been developed specifically for the purpose of assessing potential ecological impacts of routine runoff on surface waters to determine whether there is an environmental risk and if pollution mitigation measures are needed in specific circumstances[3]. Where the scheme is in proximity to or hydrologically connected to a protected site, more stringent toxicity thresholds are applied. The ES **Road Drainage and Water Environment** chapter (Volume 6 Document Ref 6.2 ES Chapter 13) includes the following conclusions in relation to impacts on water quality during operation:

[2] HD45/09 states that "The Highways Agency Water Risk Assessment Tool (HAWRAT) has been developed for this purpose and the methodology behind it has been derived from a collaborative research programme undertaken by the Highways Agency (HA) and Environment Agency (EA) which investigated the effects of routine road runoff on receiving waters and their ecology (Refs 7, 13, 23, 24, 35). The toxicity thresholds determined through the research programme, and which are used by the tool, have been designed to prevent adverse ecological effects in the receiving water. Equally, in artificial and heavily modified water bodies, the thresholds have been designed to prevent adverse effects on ecological potential. The thresholds have been developed with the EA and are consistent with the requirements of the Water Framework Directive (WFD)".

[3] http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section3/hd4509.pdf

- The levels of treatment (filter drains, detention ponds and grassed swales) embedded in the scheme design are sufficient to reduce pollutants in road drainage discharges to levels acceptable to HAWRAT.
- A long-term impact assessment of surface water runoff from the highway has been undertaken by comparing the annual average concentrations of copper and zinc estimated by the HAWRAT models with the EQSs stated in the WFD (Standards and Classifications) Directions 2015. The predicted concentrations are under the EQS thresholds for both copper and zinc at all discharge locations.
- It is therefore considered that the magnitude of impact of sediment and dissolved metals discharging into surface watercourses is negligible with a significance of effect of neutral.

2.1.22 Noting that the proposed drainage system represents an improvement on the existing situation, and that both short-term and long-term impacts to surface and groundwater are assessed as neutral, and in view of the site's conservation objectives, **an adverse effect on the integrity of the European site can be excluded.**

Changes in Hydrology

r: Impacts on local groundwater levels

2.1.23 A high-level assessment of the potential impact on local groundwater levels has been undertaken for the length of the scheme.

2.1.24 The groundwater level at cutting locations has been assessed through the groundwater monitoring data obtained as part of the Phase 1 GI carried out by Structural Soils in early 2017. Areas of cutting have been screened against the data to obtain locations where dewatering may be required. The following areas of cutting have been identified as having groundwater levels that could be impacted by the scheme:

- Chiverton Junction Side Road Cuttings (Ch 0+500 to 1+000m);
- Nanteague Mainline Cutting (Ch 6+300 to 7+450m);
- Two Barrows Mainline Cutting (Ch 7+450 to 7+900m);
- Zelah Side Road Crossing (Ch 8+150);
- Pennycomequick Side Road Crossing (Ch 11+000m); and
- Penglaze Mainline Cutting (Ch 11+200 to 11+750m).

2.1.25 Only one cutting has been identified as having the potential to lower ground water levels below those within the SAC[4]. This cutting is referred to as Penglaze Mainline Cutting, and is located approximately 270m to the south of the SAC (ch. 11+200 to 11+700).

2.1.26 Proposals are for Penglaze Cutting to reduce ground levels by up to 4.3m to levels of between 113.0 and 119.3 mOD (from west to east). The design groundwater level within the cutting is 117.5 (chainage 11+400) and 120.5mOD (chainage 11+500) resulting in potential drawdown of up to 2.3m on current

[4] All other cuttings that require dewatering will not lower water levels below those within the SAC and therefore will not affect groundwater levels within the SAC.

groundwater levels. The radius of influence has not been derived as at this stage of design no sufficient data is available.

2.1.27 The European site is located to the north of the scheme. The topography of the European site drops away the from 135mOD falling sharply northwards to 115mOD then falling gently northwards to some 70mOD. This means that in some areas of the European site, ground water levels are likely to be above the reduced groundwater levels required for the cutting. There is therefore the potential for groundwater levels with the European site to be affected, and consequently the potential exists for those qualifying habitats that are water dependent (such as Temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix*) to be affected.

2.1.28 The proposed cutting is underlain by between 2.5 and 3.5m of completely weathered to highly weathered Grampound Formation, becoming moderately and slightly weathered and eventually fresh and unweathered Grampound Formation. This stratum is typically described as comprising thinly interlaminated metamorphosed mudstone and siltstone (*phylitte*) with sporadic thin beds of metamorphosed sandstone (*psammite*) and sparse lenticular limestone.

2.1.29 The Environment Agency has classified these deposits as a Secondary A Aquifer. No site-specific permeability data has been obtained during ground investigations completed to date, however these investigations showed that the area of Penglaze Cutting is underlain by between 2.5 and 3.5m of completely to highly weathered rock Grampound Formation. The groundwater flow is anticipated to primarily take place within this weathered zone where the intergranular permeability is likely to be dominant. Within the unweathered rock the predominant groundwater-flow mechanism is via fractures. The Hydrogeological Map for England and Wales classifies the underlying bedrock as *'impermeable rocks, generally without groundwater except at shallow depth'.*

2.1.30 An east-west trending regional thrust fault is located within 200m north of scheme alignment. The projected fault line transects the southernmost extent of the SAC. A north-south trending reverse fault cross cuts this thrust approximately 270m north of Ch 12+200 and continues south to intersect the proposed alignment at approx. Ch 12+100.

2.1.31 The width of these fault zones is likely to be in a range of 10 to 15m on the basis of recent geophysical investigations of faults intersecting the proposed scheme (see Arup **GIR Addendum** (Volume 6 Document Ref 6.4 ES Appendix 9.3)). The 'fault zone' represents the zone of complex deformation associated with the fault plane and typically comprises a highly fractured system of degraded rock quality. This is likely to result in increased secondary permeability and create a preferential path for groundwater flows.

2.1.32 The topography is structurally controlled, meaning that the fluvial valley systems have exploited fault zones. Indeed, the Newlyn Downs peneplain has probably formed because of fluvial denudation along the alignment of a north-south trending regional fault. From the location of the proposed Penglaze Cutting the ground rises sharply northwards from approximately 120mOD to 140mOD forming a ridge parallel to the scheme and the SAC boundary. The ground then falls sharply northwards to 115mOD then falling gently northwards to some 70mOD. The SAC southernmost boundary is at elevation 135mOD. The ridge forms a watershed, which separates sub-catchments where the scheme area and the SAC are located.

2.1.33 The Newlyn Downs SAC site is directly underlain by the Head deposits comprising poorly sorted and poorly stratified deposits of gravel, sand and clay. Head deposits encountered within the scheme area comprised soft gravelly organic clays (see Arup **GIR Addendum** (Volume 6 Document Ref 6.4 ES Appendix 9.3)) and it is likely that deposits of similar nature underlie the SAC site. These deposits are in turn underlain by the Trendrean Mudstone Formation comprising dark grey to black metamorphosed mudstone with upward-fining siltstone laminae and some beds of pale grey fine-grained sandstone. As with the Grampound Formation, the Trendrean Mudstone Formation has been described on the Hydrogeological Map for England and Wales as impermeable and without groundwater, except for shallow depth. The Environment Agency classed the superficial deposits as a non-productive aquifer (see WSP PSSR5). No ground investigation data is available for the area of the SAC.

2.1.34 The OS map shows marshy conditions prevailing across the SAC. This indicates either very high groundwater levels or poorly drained soils. Published geology indicates the site to be underlain by deposits (both superficial and solid) of relatively low permeability. Water infiltration and groundwater recharge would be limited through such deposits. Surface runoff or shallow subsurface flows (within more permeable strata) would be driven by the topography.

2.1.35 Hydraulic connectivity between the scheme and the SAC site has been primarily considered in a context of permeability of individual geological formations. The permeability includes the interconnection between the pores at a fundamental level within the rock (primary permeability) and fractures/joints in rock bodies (secondary porosity).

2.1.36 Both rock formations in question comprise metamorphic sedimentary layers. The permeability of these strata relies on secondary permeability interconnections. The primary porosity would control the flows within the weathered zone, with greater flows in granular than in cohesive weathered rock. Therefore, the groundwater flow is likely to be predominantly within the weathered metamorphic sandstone beds (granular) with weathered metamorphic mudstones or siltstones (cohesive) typically forming aquicludes. The ground investigations undertaken within the area of the cut encountered fractured thinly interbedded layers of metamorphic mudstones and sandstones with varied degree of weathering within the cut zone. Therefore, both groundwater flow mechanisms will be present within the affected zone of rock. The flow mechanism within the bedrock underlying the SAC site is likely to be of similar nature, however the weathered bedrock is likely to comprise cohesive materials and therefore limited groundwater flows would be expected.

2.1.37 The formations underlying the scheme and the protected area are separated by the fault zone, highly deformed and fractured complex system, which is known to have a significant impact on the hydrogeological regime. The groundwater flow is likely to be confined to the weathered metamorphic sandstone strata or through fractured layers escaping by flow along the fault zone, located between the scheme area and the SAC site, or rockhead (e.g. as a spring), or both. Geological faults are known to interrupt groundwater flows making it flow along the fault, in this case away from both the scheme and the SAC. Therefore, the presence of the watershed further limits interaction between the scheme and the SAC site,

[5] WSP | Parsons Brinkerhoff. 2017. A30 Chiverton to Carland Cross Preliminary Sources Study. Report HAGDMS No. 29326.

and the potential for hydraulic connectivity between the two formations is considered to be very low.

Conclusion

2.1.38 The review of the hydrogeological setting of the proposed scheme and the Newlyn Downs SAC site concluded that the bedrock formations underlying both sites are unlikely to be in hydraulic continuity. Therefore, the activities associated with the construction of the proposed scheme would not affect the SAC, and **an adverse effect on the integrity of the European site can be excluded.**

Introduction of invasive species

s:

2.1.39 Introduction of invasive species could potentially occur during the construction phase. Invasive species are listed on *Schedule 9* of the *Wildlife and Countryside Act (WCA), 1981 (as amended)*, which states that it is an offence to plant or otherwise cause these plants to grow in the wild. This could include cutting the plant or roots and disturbing surrounding soil if not correctly managed. Surveys undertaken in 2017 recorded Japanese knotweed (*Fallopia japonica*) as present in two areas within the survey area to the south of Chiverton Cross, and was evidently undergoing weedkiller treatment in situ. Other Schedule 9 species identified included Montbretia (*Montbretia Crocosmia* x *crocosmiiflora*), Japanese Rose (*Rosa rugosa*), Rhododendron (*Rhododendron ponticum*), cotoneaster (*Cotoneaster* sp.), three-cornered garlic (*Allium triquetrum*), variegated archangel (*Lamiastrum galeobdolon*) and New Zealand pygmyweed (*Crassula helmsii*). Locations of these are presented in Figure 8.2 (Volume 6, Document Ref 6.3) and Figure 3 in 2017 Phase 1 habitat update survey report (Volume 6 Document Ref 6.4 ES Appendix 8.3)).

2.1.40 Construction management measures will be implemented through the **Outline CEMP** (Volume 6 Document Ref 6.4 ES Appendix 16.1). The outline CEMP will be developed into a fully detailed final CEMP once the detailed design and construction plans have been finalised. The CEMP is a live document and will be maintained throughout the construction phase. The **Outline CEMP** (Volume 6 Document Ref 6.4 ES Appendix 16.1) has included the following provisions in order to ensure that invasive species are managed appropriately and to control the spread of such species where present during the construction phase:

- Pre-construction survey of all areas within construction footprint to identify the location of any invasive species.
- A Method Statement for preventing the spread of any invasive species should be produced at Detailed Design stage and included within the CEMP. Implementation of these requirements should be undertaken through site set up and provision of Toolbox Talks for all personnel prior to works commencing.

2.1.41 This will ensure that the extent and distribution of qualifying habitats and species, and the form and function of qualifying habitats is not affected by the spread of invasive species. As such, and in view of the relevant site conservation objectives, **an adverse effect on the integrity of the European site can be excluded**.

In-combination effects

t:

2.1.42 A total of 88 projects were identified within 7km of the scheme (listed within **Consideration of cumulative effects** (Volume 6 Document Ref 6.4 ES Appendix 15.1). Of these, it was considered that 77 projects were unlikely to result in in-combination effects with the scheme, resulting in a remaining 11 projects being 'shortlisted' for consideration within **Consideration of cumulative effects** (Volume 6 Document Ref 6.2 Chapter 15). Of these 11 other projects, the closest to Newlyn Downs SAC is located approximately 1.9 kilometres south of the European site (Proposed erection of a 1 x 1.5 Mw wind turbine, transformer, grid connection, access road and ancillary infrastructure.). The next nearest development identified is located 5.3km away.

2.1.43 Changes in Air quality during construction[6] – Impacts from the scheme are assessed as negligible. There are no proposed developments identified within the DMRB threshold for air quality impacts on designated sites of 200m and therefore **in-combination effects resulting from changes in air quality during construction can be excluded**.

2.1.44 Change in water quality – Impacts on surface and groundwater quality during construction, impacts on water quality during operation, and impacts on water quality from accidental spillage are assessed as neutral or negligible. Therefore, no potential exists for in-combination effects to result from these impacts, **and in-combination effects resulting from these specific impacts can be excluded.**

2.1.45 Changes in hydrology - the potential for hydraulic connectivity between the scheme and the European Site is considered to be very low. Therefore, no potential exists for in-combination effects to result from these impacts, and **in-combination effects resulting from these specific impacts can be excluded.**

2.1.46 Given the scale, nature of impacts and distance of other projects from the European site it can be concluded that no in-combination effects are likely to occur, and **an adverse effect on the integrity of the European site can be excluded**.

[6] There is no need to consider the potential for in-combination effects resulting from changes in air quality during operation, as the assessment of the scheme alone concluded that predicted NOx levels are all considerably below the critical level/limit value of 30µg/m3, and the predicted levels were based on the traffic model for a future opening year scenario (2023) which takes into account forecast growth based on a combination of background growth and specific proposed developments. A review of the local plan and major planning applications was undertaken to identify 'large developments' in proximity to the scheme that were considered likely to have a direct impact on future demand on the A30. These were then included at specific locations within the traffic model. Therefore, the predicted NOx levels for the scheme already take into account in-combination effects and have concluded that a likely significant effect can be excluded at the screening stage.

Table 2-3 HRA Integrity Matrix 6: Breney Common and Goss and Tregoss Moors SAC

Name of European site and designation: Breney Common and Goss and Tregoss Moors SAC						
EU Code: UK0030098						
Distance to NSIP: 9.2km						
European site features	**Likely effects of NSIP**					
Effect	1) Change in air quality			2) In combination effects		
Stage of Development	C	O	D	C	O	D
Northern Atlantic wet heaths with *Erica tetralix*		✕*u*			✕*w*	
European dry heaths		✕*u*			✕*w*	
Transition mires and quaking bogs		✕*u*			✕*w*	
Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia*		✕*v*			✕*w*	

Evidence supporting conclusions

Changes in air Quality

u:

2.1.47 Predicted NOx levels exceed the 30µg/m^3 critical level at locations within 0-10m of the roadside. The magnitude of change as a result of the scheme exceeds 1% of the critical level at the kerbside. Therefore, a LSE could not be excluded at the screening stage, and further assessment is required.

2.1.48 Applying the approach set out in DMRB HA 207/07 a comparison of predicted nitrogen deposition against the critical load for the qualifying habitat within the site is required.

2.1.49 In this case, there are a number of qualifying habitats and species for which the European site is designated. These are shown in Table 2-4 below along with the Critical loads obtained from the Air Pollution Information System Website[7]:

Table 2-4 Critical Loads for the qualifying features at Breney Common and Goss and Tregoss Moors SAC

European Site Feature (code)	Critical Load Class	*Critical load (kg N ha^{-1} y^{-1})*
Euphydryas (Eurodryas, Hypodryas) aurinia - Marsh fritillary butterfly	Non-mediterranean dry acid and neutral closed grassland	10-15
Euphydryas (Eurodryas, Hypodryas) aurinia - Marsh fritillary butterfly (1065)	Sub-atlantic semi-dry calcareous grassland	15-25
Transition mires and quaking bogs (7140)	Valley mires, poor fens and transition mires	10-15

[7] http://www.apis.ac.uk/

European Site Feature (code)	Critical Load Class	*Critical load (kg N ha^{-1} y^{-1})*
Euphydryas (Eurodryas, Hypodryas) aurinia - Marsh fritillary butterfly (1065)	Moist and wet oligotrophic grasslands: *Molinia caerulea* meadows	15-25
Northern Atlantic wet heaths with *Erica tetralix* (4010)	Northern wet heath: *Erica tetralix* dominated wet heath	10-20
European dry heaths (4030)	Dry heaths	10-20

2.1.50 The predicted deposition rate at each receptor is compared with the relevant critical load.

2.1.51 In order to identify the relevant critical load, it is necessary to understand what habitat is present within 0-10m of the roadside where exceedances of the critical level are predicted.

2.1.52 The following habitat mapping was obtained to inform this process, and a summary of habitats present within 0-10m of the kerbside is presented in Table 2-5 below:

- Phase 1 and NVC Habitat surveys undertaken for and contained within the 2003 ES for the A30 Bodmin to Indian Queens Improvement Scheme (which comprises the stretch of the ARN that runs through the Breney Common and Goss and Tregoss Moors SAC); and
- Phase 1 and NVC Habitat surveys undertaken by Natural England in 2015 to inform a review of the Mid-Cornwall Moors SSSI Boundary.

Table 2-5 Habitat types in the SAC within 10m of the A30 based on NVC Habitat surveys undertaken for the A30 Bodmin to Indian Queens Scheme and by Natural England to inform the citation of Mid-Cornwall Moors SSSI. NVC communities representing qualifying habitat is shaded in green. Habitat is identified by ID number correlating with areas shown in the figures provided in Volume 6 Document Ref 6.5 Appendix 6

ID	Area (m^2)	Area (ha)	Phase 1 Habitat type[8]	NVC community[9]	NVC community [10]	Review of aerial imagery/OS mapping	Area and category of Annex I habitat	Critical Load (kg N ha^{-1} y^{-1})
1	3573.1	0.357	Not mapped	Not mapped[11]	777.5m^2 W1 *Salix cinerea Galium palustre* woodland Remaining 2795.6m^2 not mapped.	Remaining area to north of A30 between NVC mapped area and road is continuous with woodland. Remaining area to south of the A30 consists of a line of trees and hardstanding (access track). Therefore, no Annex 1 habitat identified.	0m^2	N/A
2	3.1	0.0003	Dense continuous scrub	Not mapped	Not mapped	Assumed to be dense continuous scrub based on aerial imagery and previous Phase 1 habitat survey.	0m^2	N/A
3	6835.5	0.684	Dense continuous scrub	North of A30 not mapped, south of A30 W23 *Ulex europaeus Rubus*	4.9m^2 W1 *Salix cinerea Galium palustre* woodland 21.2m^2 W23 *Ulex europaeus Rubus fruticosus* scrub 987.4m^2 no NVC – scrub	Remaining area appears to be continuous with scrub and woodland mapped in NVC	0m^2	N/A

[8] Source: The A30 Bodmin to Indian Queens Improvement Scheme Environmental Statement (2003)
[9] Source: The A30 Bodmin to Indian Queens Improvement Scheme Environmental Statement (2003)
[10] Source: Natural England (2015)
[11] Where identified as not mapped within the NVC survey for the Bodmin to Indian Queens Improvement Scheme, it is assumed that this is because the area was previously identified as part of the Phase 1 habitat survey as not being of value and was therefore excluded from the NVC survey

ID	Area (m^2)	Area (ha)	Phase 1 Habitat type[8]	NVC community[9]	NVC community [10]	Review of aerial imagery/OS mapping	Area and category of Annex I habitat	Critical Load (kg N ha^{-1} y^{-1})
				fruticosus scrub	Remaining 5822m^2 not mapped			
4	4376.3	0.438	Dense continuous scrub	W1 *Salix cinerea Galium palustre* woodland	513.3m^2 W1 *Salix cinerea Galium palustre* woodland 363.8m^2 M25 *Molinia caerulea – Potentilla erecta* mire 979.1m^2 no NVC – scrub 1488.8m^2 no NVC – heath Remaining areas north and south of A30 - 1031.3m^2 not mapped	Remaining area north (RAN) of A30 (561.8m^2) appears to be contiguous with scrub and trees mapped in NVC. Remaining area south (RAS) of A30 (469.5m^2) may be heath Annex I habitat.	1488.8 (heath)+ 469.5 = 1958.3m^2 Assumed to be 4030 European dry heaths	*10-20*
5	693.2	0.069	Dense continuous scrub	W1 *Salix cinerea Galium palustre* woodland	199.1m^2 mapped as W1 *Salix cinerea Galium palustre* woodland 336.7m^2 no NVC – scrub Remaining 157.4m^2 not mapped	Remaining area appears to be grassland and scrub with gorse present. Potential for heather species but unlikely to represent Annex I Habitat.	0m^2	N/A
6	657.6	0.066	Dry dwarf shrub heath	H4c *Ulex gallii Agrostis curtisii* heath, *Erica tetralix* sub-community	328.3m^2 no NVC – heath Remaining 329.3m^2 not mapped	Remaining area appears to be gorse and heather scrub embankment. Assumed to be Annex I Habitat (H4c).	657.6m^2 assumed to be 4030 European dry heaths[12]	10-20
Total Annex I habitat within 10m of the ARN							2615.9m^2 (0.26Ha)	

[12] http://jncc.defra.gov.uk/protectedsites/sacselection/habitat.asp?FeatureIntCode=H4030

2.1.53 Based on the NVC communities identified, the qualifying habitat is identified as being within the NVC habitats that make up European dry heath (4030)[13]. Therefore, for the purpose of assessing the impacts of nitrogen deposition on qualifying habitat, the critical load for European Dry Heath of 10-20 kg N ha^{-1} yr^{-1} has been applied.

2.1.54 Predicted nitrogen deposition levels under the Do-something (2023) scenario range from between 17.2 – 19.3 kg N ha^{-1} yr^{-1}, are marginally higher than the Do-minimum scenario, and exceed the lower limit but do not exceed the upper limit of the critical load threshold at all locations (See Table 2-6 below).

2.1.55 In accordance with DMRB, where the critical load is exceeded, it is necessary to consider the magnitude of change in nitrogen deposition between the Do-Minimum (2023) and the Do-something (2023) scenarios. IAN 174/13 and the IAQM position statement support the definition of an 'imperceptible impact' as being less than or equal to 1% of the critical load. In this case 1% of the critical load equates to 0.1-0.2 kg N ha^{-1} yr^{-1}.

2.1.56 Predicted increases were between 0.01 - 0.13 kg N ha/yr, which do not exceed 1% of upper limit for the critical load. However, they do exceed 1% of lower limit for the critical load within 0-10m of the kerbside.

2.1.57 In the case of European Dry Heaths, guidance recommends that the high end of the range of the critical load is applied in areas that experience high precipitation[14]. Cornwall receives comparatively high levels of precipitation, and therefore the expectation would be that the upper limit for the critical load would be an appropriate threshold to apply in this case. Applying the upper limit, it could be concluded that the highest change in Nitrogen Deposition predicted with the scheme in place is 0.13 kg N ha^{-1} yr^{-1}. This is considerably below 1% of the upper limit of critical load, and would therefore comprise **an 'imperceptible impact'.**

Table 2-6 Predicted change in Nitrogen deposition at Breney Common and Goss and Tregoss Moors SAC

Receptor ID	Site name	Nitrogen deposition (kg N ha^{-1} yr^{-1}) in 2023			
		Baseline	2023 DM	2023 DS	Change
Eco50	Breney Common and Goss & Tregoss Moors	17.4	19.14	19.27	0.13
Eco51	Breney Common and Goss & Tregoss Moors	17.4	18.17	18.24	0.07
Eco52	Breney Common and Goss & Tregoss Moors	17.4	17.51	17.53	0.02
Eco53	Breney Common and Goss & Tregoss Moors	17.4	17.35	17.36	0.01
Eco54	Breney Common and Goss & Tregoss Moors	17.4	19.04	19.16	0.12
Eco55	Breney Common and Goss & Tregoss Moors	17.4	18.10	18.16	0.06
Eco56	Breney Common and Goss & Tregoss Moors	17.4	17.39	17.41	0.02

[13] http://jncc.defra.gov.uk/protectedsites/sacselection/habitat.asp?FeatureIntCode=H4030
[14] http://www.apis.ac.uk/srcl/select-a-feature?site=UK0030098&SiteType=SAC&submit=Next

Receptor ID	Site name	Nitrogen deposition (kg N ha^{-1} yr^{-1}) in 2023			
		Baseline	2023 DM	2023 DS	Change
Eco57	Breney Common and Goss & Tregoss Moors	17.4	17.24	17.25	0.01
Eco58	Breney Common and Goss & Tregoss Moors	17.4	19.15	19.27	0.13
Eco59	Breney Common and Goss & Tregoss Moors	17.4	18.08	18.14	0.06
Eco60	Breney Common and Goss & Tregoss Moors	17.4	17.44	17.46	0.02
Eco61	Breney Common and Goss & Tregoss Moors	17.4	17.28	17.29	0.01
Eco62	Breney Common and Goss & Tregoss Moors	17.4	18.97	19.08	0.12
Eco63	Breney Common and Goss & Tregoss Moors	17.4	18.06	18.12	0.06
Eco64	Breney Common and Goss & Tregoss Moors	17.4	17.45	17.47	0.02
Eco65	Breney Common and Goss & Tregoss Moors	17.4	17.30	17.31	0.01
Eco66	Breney Common and Goss & Tregoss Moors	17.4	17.21	17.21	0.01
Eco67	Breney Common and Goss & Tregoss Moors	17.4	17.25	17.26	0.01

2.1.58 However, taking a precautionary approach, and applying the guidance set out in HA 207/07 further reconsideration is required by an ecologist to assess the change in deposition due to the project in relation to the critical load relevant to the interest features of the site, the background deposition and the extent of any exceedances.

2.1.59 It is important to note that all receptor locations exceed the lower limit of the critical load under the baseline and Do-minimum scenarios, and that the Do-minimum scenario demonstrates increases in nitrogen deposition ranging from <0.01 – 1.7µg/m^3 when compared against the baseline i.e. between 0-10m of the kerbside, these increases are considerably larger than those predicted when comparing the Do-something against the Do-minimum scenarios.

2.1.60 All exceedances of the critical level and of 1% of the lower limit of the critical load under the Do-something scenario, are predicted to occur within 0-10m of the roadside.

2.1.61 As shown in Table 2-7 below, the area within 0-10m of the kerbside within the SAC amounts to 1.6Ha comprising just 0.2% of the SAC.

Table 2-7 Calculation of the area of SAC within 10m of the A30 kerbside

Updated area of SAC[15]	Area of SAC within 10m of A30 and verge
821.6 ha (8216018.532m^2)	1.6 ha (16138.85m^2) = 0.20% of the SAC

2.1.62 In order to further consider the effect on the integrity of the European Site, it is necessary to understand the nature of the habitat likely to be affected and then to consider what contribution that habitat makes to the integrity of the site.

2.1.63 Based on NVC Habitat surveys undertaken for the A30 Bodmin to Indian Queens Scheme and by Natural England as a part of the designation of Mid Cornwall Moors SSSI, and taking a precautionary approach, a total of 2615.9m^2 (0.26 Ha) was considered to potentially qualify as Annex I habitat for the site[16]. This qualifying habitat comprises approximately 0.03% of the total area of the SAC.

2.1.64 Therefore, of the area of the SAC located within the 0-10 m of the ARN, only a small fraction was identified as potentially containing Annex I Habitat for which the SAC was designated. All of the qualifying habitat in this area was categorised as European dry heath (See Table 2-5 above).

2.1.65 The NATURA 2000 - Standard Data Form for the site[17] identifies an area of 125.26 ha of "4030 European dry heaths" which includes the NVC habitat type H4.

2.1.66 Based on NVC Habitat surveys undertaken by Natural England (2015), the total area of habitat mapped as H4 within the European Site equates to 83.6 hectares. Therefore, the area of habitat mapped as H4 within 0-10m of the roadside accounts for just 0.07% of the total recorded habitat type within the SAC.

2.1.67 No direct loss of qualifying habitat will occur and there will be no change to the distribution of such habitats. Very small increases in nitrogen deposition (0.12-0.13 kg N ha^{-1} yr^{-1}) are predicted and the area affected by such an increase is already exceeding the lower limit of the critical load under the baseline conditions.

2.1.68 Additionally, this area includes only 0.2% of the qualifying habitat within the SAC. Furthermore, exceedances of 1% of the lower limit were predicted within 0-10m of the kerbside and it is likely that any increases in nitrogen deposition have decreased to less than the 1% of the lower limit of critical load before reaching 10m from the roadside.

2.1.69 Moreover, in this case the upper limit of the critical load is likely to be most applicable, and this upper limit is not predicted to be exceeded. Therefore, in reality the assessment presented above represents a worst case, and any impact from nitrogen deposition resulting from the scheme will be imperceptible.

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[15] The official area presented in the Natura 2000 Data form for Breney Common and Goss & Tregoss Moors SAC is 824.05 ha. However, the map of the SAC boundary presented in the data form, includes the area now occupied by the A30 Bodmin to Indian Queens development. Therefore, this dual carriageway lies within the boundary of the SAC, despite not supporting the habitats or species for which the SAC was designated. As such, for the purpose of this assessment, the area of the A30 and verge that lies within the SAC boundary was removed, resulting in the SAC having an updated area of 821.6 ha.

[16] NVC types that are classified as making up the relevant Annex 1 habitats were identified from the JNCC website as:
4010 Northern Atlantic wet heaths with *Erica tetralix* - http://jncc.defra.gov.uk/protectedsites/sacselection/habitat.asp?FeatureIntCode=H4010
4030 European dry heaths - http://jncc.defra.gov.uk/protectedsites/sacselection/habitat.asp?FeatureIntCode=H4030
7140 Transition mires and quaking bogs - http://jncc.defra.gov.uk/protectedsites/sacselection/habitat.asp?FeatureIntCode=H7140

[17] http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0030098

2.1.70 Applying professional judgement, it is concluded that any increases would not have a discernible degradational effect, and the structure and function (including typical species) of qualifying habitats is unlikely to be affected. As such, and in view of the relevant site conservation objectives, **an adverse effect on the integrity of the European site can be excluded.**

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2.1.71 Predicted NOx levels exceed the 30µg/m3 critical level at several locations within 0-10m of the roadside within the SAC. The magnitude of change as a result of the scheme exceeds 1% of the critical level at the kerbside. Therefore, there is the potential for an effect on qualifying species within the SAC.

2.1.72 In the case of the Breney Common and Goss and Tregoss Moors SAC the only qualifying species is marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia.* The SAC contains a cluster of three marsh fritillary sub-populations over a complex of wet heathland sites.

2.1.73 Marsh fritillary is an Annex II species listed as a primary reason for the site's designation. The SAC supports the largest metapopulation in Cornwall and probably the most westerly viable population in England.

2.1.74 This species breeds primarily in damp acidic grassland where the larval food plant, devils'-bit scabious *Succisa pratensis*, can be abundant. Optimal breeding areas are typically a patchwork of short vegetation and long tussock grasses dominated by cattle-grazed purple moor-grass *Molinia caerulea*. Connected habitats, within a 1-2 km radius of one another support fluctuating meta-populations, which support more distant dispersal and robustness of the population overall.

2.1.75 The SAC falls wholly within the Mid-Cornwall SSSI, which is also designated in part for its population of marsh fritillary, and for which Natural England have provided NVC Habitat Mapping. This mapping identifies the extent of, and the NVC habitats that make up, the primary and secondary habitat that supports the Mid Cornwall Moors (and therefore the Population of the Breney Common and Goss and Tregoss Moors SAC) marsh fritillary populations. This information has been used to inform the assessment **SIAA Appendix 9 Marsh Fritillary Habitat** (Volume 6 Document Reference 6.5).

2.1.76 The information provided by NE includes sightings of marsh fritillary. There have not been any sightings of the species within 0-10m of the roadside, the nearest two sightings are over 100m from the roadside with the majority of sightings located over 500m south of the A30.

2.1.77 A number of small patches of primary and secondary habitat for the marsh fritillary are located adjacent to the A30 within 0-10m of the kerbside (See **SIAA Appendix 9 Marsh Fritillary Habitat** (Volume 6 Document Reference 6.5)). According to NVC mapping provided by NE, the majority of mapped habitat within 0-10m of the roadside comprises the following NVC habitats:

Table 2-8 NVC Habitat types in the SAC within 10m of the A30 identified as being primary or secondary habitat for the Marsh Fritillary. Cells shaded in green represent likely primary and secondary habitat for the Marsh Fritillary Population.[18]

NVC Code	Habitat Type	NVC Type	Primary/secondary habitat for Marsh Fritillary	Total area for this Habitat Group within SSSI (m2)	Area within 10m of ARN (m2)	Percentage of Habitat Group within 10m of ARN (%)
M23	Mire	*Juncus effusus/acutiflorus - Galium palustre* rush-pasture	Primary	1269729	371	0.03
M25	Mire	*Molinia caerulea – Potentilla erecta*	Primary	2056819	364	0.02
MG10	Mesotrophic Grassland	*Holcus lanatus – Juncus effusus* rush-pasture	Secondary	262984	414	0.16
MG6	Mesotrophic Grassland	*Lolium perenne - Cynosurus cristatus* grassland	No	298061	1283	0.43
No NVC (Highways England) – Grassland	Grassland	N/A	No	725217	10511	1.45
No NVC (Highways England) - Heath	Heath	N/A	No	1716588	10674	0.62
No NVC - Misc.	N/A	N/A	No	N/A	84	
No NVC - Scrub	Scrub	N/A	No	231796	1750	0.76
No NVC - Willow scrub	Willow scrub	N/A	No	685445	1457	0.21
No NVC (Highways England)- Woodland	Woodland	N/A	No	7478979	692	0.01
Not surveyed	N/A	N/A	No	N/A	764	

[18] https://consult.defra.gov.uk/natural-england/mid-cornwall-moors/supporting_documents/Mid%20Cornwall%20Moors%20Marsh%20fritillary%20Eurodryas%20aurinia%20distribution%20and%20habitat%20management.pdf

NVC Code	Habitat Type	NVC Type	Primary/secondary habitat for Marsh Fritillary	Total area for this Habitat Group within SSSI (m2)	Area within 10m of ARN (m2)	Percentage of Habitat Group within 10m of ARN (%)
W23	Woodland	*Ulex europaeus-Rubus fruticosus agg.* scrub	No	456741	23	0.00
W25	Woodland	*Rubus fruticosus agg. – Pteridium aquilinum* underscrub	No	256235	219	0.09
				Total Area of Primary and secondary Habitat within 10m of the ARN (Ha)	Total Area of Primary and secondary Habitat available (Ha) to the MF population	Total Area within 10m of the ARN as a percentage of all primary and secondary Habitat available to the MF population

2.1.78 The total area of supporting habitat within the functional habitat zone for the species' population of the Mid-Cornwall Moors SSSI is set out below:

- Primary Habitat – 371.2 Ha
- Secondary Habitat – 245.4 Ha

2.1.79 In summary, within 0-10m of the kerbside there is:

- 0.07 Ha of primary habitat amounting to 0.05% of the total of this type of habitat available, and 0.02% of the total available primary habitat within the functional habitat zone for the population; and
- 0.04 Ha of secondary habitat amounting to 0.16% of the total of this type of habitat available, and 0.016% of the total available secondary habitat within the functional habitat zone for the population.

2.1.80 In order to understand the likely effects of nitrogen deposition on the supporting habitats it is necessary to identify the critical loads for the habitats in question.

2.1.81 Determination of the applicable critical loads for the NVC habitat types that form part of the primary or secondary habitat for marsh fritillary and which are located within 0-10m of the A30, is set out in Table 2-9 below.

Table 2-9 Relevant Nitrogen Critical Loads for Marsh Fritillary Supporting Habitats within 0-10-m of the ARN

NVC Code	Habitat Type	NVC Type	broad habitat types[19]	Empirical Critical Load kg N/ha/yr	Area within 0-10m of the ARN (Ha)
M23	Mire	*Juncus effusus/acutiflorus - Galium palustre* rush-pasture	Fen,marsh and swamp	15 - 25	0.037
M25	Mire	*Molinia caerulea – Potentilla erecta*	Fen,marsh and swamp Bogs	15 - 25	0.036
MG10	Mesotrophic Grassland	*Holcus lanatus – Juncus effusus* rush-pasture	Neutral grassland	not specifically identified within the broad habitat types identified for the site within APIS, however the Relevant Nitrogen Critical Load Class for "Non-Mediterranean dry acid and neutral closed grassland" of 10-15 has been applied	0.04

[19] http://jncc.defra.gov.uk/pdf/jncc307_table5.pdf

2.1.82 Of the habitat types located within 0-10m of the kerbside, none are categorised as being acidic grassland[20] which is identified as being the primary breeding habitat for the marsh fritillary[21].

2.1.83 Predicted nitrogen deposition levels under the Do-something (2023) scenario range from between 17.2 – 19.3 kg N ha^{-1} yr^{-1} (See Table 2-6 above). These levels of nitrogen deposition exceed the lower limit of the critical load for all habitats, and the upper limit of the critical load for NVC community MG10. The upper limit of the critical load is not predicted to be exceeded for NVC Communities M23 and M25.

2.1.84 In accordance with DMRB, where the critical load for the relevant habitat is exceeded, it is necessary to consider the magnitude of change in nitrogen deposition between the Do-Minimum (2023) and the Do-something (2023) scenarios. IAN 174/13 and the IAQM position statement support the definition of an 'imperceptible impact' as being less than or equal to 1% of the critical load.

2.1.85 In this case 1% of the critical load equates to 0.1-0.15 kg N ha^{-1} yr^{-1} for NVC Type MG10, and 0.15-0.25 kg N ha^{-1} yr^{-1} for NVC Types M23 and M25.

2.1.86 Very small increases in nitrogen deposition (0.12-0.13 kg N ha^{-1} yr^{-1}) are predicted under the Do-something scenario.

2.1.87 1% of the critical load is not exceeded in the cases of NVC Types M23 and M25, therefore the impact on these habitats is assessed as being imperceptible, and no primary habitat is likely to be adversely affected.

2.1.88 1% of the critical load is exceeded for NVC Type MG10 (*Holcus lanatus – Juncus effusus* rush-pasture) which is categorised as secondary habitat. Therefore, there is the potential for an adverse effect on an area of 0.04Ha of this habitat amounting to 0.16% of the total available habitat of this type and 0.016% of all available secondary habitat. The increase is just above 1% of the lower limit of the critical load (below which any impact is considered to be imperceptible) and is comfortably within 1% of the upper limit of the critical load.

Conclusion

2.1.89 Given the relevant critical loads and the very small increases in nitrogen deposition (0.12-0.13 kg N ha^{-1} yr^{-1}) that are predicted, any increase is only likely to affect secondary habitat for the marsh fritillary. The area potentially affected is small, and makes up only 0.016% of all available secondary habitat.

2.1.90 The area of habitat affected is already exceeding the lower and upper limit of the critical load for the secondary habitat identified, under the baseline conditions. Furthermore, predicted exceedances of 1% of the lower limit are likely to have further decreased before reaching 10m from the kerbside, and nitrogen deposition levels are comfortably within 1% of the upper limit of the critical load. Therefore, in reality the assessment presented above represents a worst case, and any impact from nitrogen deposition resulting from the scheme will be imperceptible.

2.1.91 Applying professional judgement, it is concluded that any increases would not have a discernible degradational effect on the habitat supporting the marsh fritillary, and the structure and function of qualifying species population is unlikely

[20] http://jncc.defra.gov.uk/pdf/jncc307_table5.pdf
[21] https://consult.defra.gov.uk/natural-england/mid-cornwall-moors/results/mcm-confirmation-citation.pdf

to be affected. As such, and in view of the relevant site conservation objectives, **an adverse effect on the integrity of the European site can be excluded**.

In-Combination Effects

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2.1.92 The only potential effect from the scheme on this European site is from changes in air quality resulting from the scheme during operation. The calculations for NOx and Nitrogen deposition provided above in the consideration of air quality impacts during operation, are based on a traffic model that already takes into account forecast growth based on a combination of background growth and specific proposed developments. No additional sources of substantial nitrogen emissions have been identified within 200m of the European Site. Therefore, the conclusion **of no adverse effect on the integrity of the SAC** presented above already takes into account the potential for in-combination effects.

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