Vale of Glamorgan Replacement Local Development Plan

Preferred Strategy Habitats Regulations Assessment

Vale of Glamorgan Council

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BP

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Quality information

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Executive Summary

Introduction

AECOM was appointed by Vale of Glamorgan Council (VGC) to undertake a Habitats Regulations Assessment (HRA) of its Preferred Strategy Replacement Local Development Plan (RLDP), which specifies broad growth targets for the authority between 2021 and 2036. Policy SP1 (Growth Strategy) provides for 7,890 dwellings and 67.8ha of employment space, with the location of Key Sites for development also being identified in the RLDP. The objective of the HRA is to identify any aspects of the RLDP that could result in Likely Significant Effects (LSEs) and, where relevant, adverse effects on the integrity of European sites, including Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and, as a matter of Government policy, Ramsar sites. The HRA assesses potential environmental impacts from the RLDP alone, as well as in-combination with other plans and projects, advising on appropriate policy mechanisms for delivering mitigation where required. However, given its relatively early stage of development, the RLDP does not yet set out all development allocations nor comprehensive policy wording. As such, the Appropriate Assessment (AA; the second stage of the HRA process) of some of the impact pathways is deferred to the Deposit Plan HRA and areas of further work to inform that HRA are identified.

Legislative Context

The need for an assessment of impacts on European sites is set out in English and Welsh law by the Conservation of Habitats and Species Regulations 2017 (as amended). To ascertain whether the integrity of any European sites will be affected, competent authorities must therefore undertake an HRA of the plan or project in question, including an AA if necessary, before approving it.

Scope

Given an initial assessment of the relevant European sites within 15km of the Vale of Glamorgan, their sensitivities and the likely impact pathways arising from RLDP policies, the following European sites are included in the assessment (at least until completion of the LSEs Screening stage): Severn Estuary SAC / SPA / Ramsar, Dunraven Bay SAC, Kenfig SAC, Cardiff Beech Woods SAC, Cefn Cribwr Grasslands SAC and Blackmill Woodlands SAC.

HRA tasks

Following initial evidence gathering, the first stage of any Habitats Regulations Assessment is a screening for LSEs, essentially an assessment of the potential risks of development plans for European sites. If LSEs cannot be excluded, mainly because a realistic mechanism for an adverse interaction between a policy and a qualifying habitat / species is present, the next stage of HRA, known as AA, is triggered. The AA is a more detailed analysis of the impact pathways and European sites considered at the Screening stage. One of the key aspects of AAs is the consideration of mitigation measures, which help protect European sites from adverse effects on site integrity. In this HRA both LSEs Screening and AA were carried out.

Findings & Recommendations

Based on objective information, LSEs could be excluded for some impact pathway – European site interactions. However, LSEs could not be excluded for some impact pathways in relation to the Severn Estuary SAC / SPA / Ramsar, Cardiff Beech Woods SAC and Kenfig SAC. The following impact pathways were screened in for AA:

- Recreational pressure in the Severn Estuary SAC / SPA / Ramsar;
- Water quality in the Severn Estuary SAC / SPA / Ramsar and Kenfig SAC;
- Water quantity, level and flow issues in the Kenfig SAC and Severn Estuary SAC / SPA / Ramsar;

- Loss of functionally linked habitat in relation to the Severn Estuary SPA / Ramsar;
- Visual and noise disturbance to qualifying birds in the Severn Estuary SPA / Ramsar; and
- Coastal squeeze impacts in the Severn Estuary SAC / SPA / Ramsar.

In most instances, further information (e.g. full set of allocations, complete policy wording) is required to undertake a thorough assessment and make definitive conclusions / recommendations. Furthermore, additional information will be sought from relevant stakeholders (e.g. Welsh Water, Natural England and Environment Agency) in support of the Deposit Plan HRA. The following paragraphs summarise the key findings and recommendations regarding the most pertinent impact pathways and European sites.

Recreational Pressure

The Preferred Strategy RLDP allocates Key Sites within the 7km core recreational catchment of the Severn Estuary SAC / SPA / Ramsar, which will lead to an increase in recreational pressure along the estuary. For the Deposit RLDP, AECOM will engage with Natural Resources Wales and the Vale of Glamorgan Council ecologist over the need to deliver mitigation for this site along the east of the authority. One potential approach would be to deliver location-specific measures at relevant access points. Alternatively, a collaborative approach with other authorities delivering residential growth in the core recreational catchment of the Severn Estuary SAC / SPA / Ramsar (e.g. Stroud District Council, Cardiff City Council, Monmouthshire Council) could be developed.

The AA noted that there is some uncertainty regarding the current recreational baseline and existing negative impacts to qualifying habitats within the Cardiff Beech Woods SAC. Notwithstanding this, due to the geographic distribution of residential growth (all Key Sites lying considerably more distant from the SAC than a typical 5km core catchment for terrestrial European sites), it is considered extremely unlikely that the Vale of Glamorgan RLDP will make a significant contribution to any deviation from the current recreational baseline. Therefore, there will be no adverse effects of the RLDP on the Cardiff Beech Woods SAC regarding recreational pressure, both alone and in-combination.

Water Quality

A review of Wastewater Treatment Works (WwTWs) serving the Vale of Glamorgan indicates that developments in the eastern part of the authority (closest to the Severn Estuary SAC / SPA / Ramsar) are likely to be served by Cog Moors WwTW. However, this WwTW discharges to the River Cadoxton (via Sully Brook), which enters the Bristol Channel to the west of the SAC / SPA / Ramsar. It is unlikely that there is any material hydrological link between treated sewage effluent from the Cog Moors WwTW and the Severn Estuary SAC / SPA / Ramsar. Overall, therefore, adverse effects of the Vale of Glamorgan RLDP on the Severn Estuary SAC / SPA / Ramsar regarding water quality impacts from treated sewage effluent can be excluded.

The water quality in the Kenfig SAC is likely to be influenced by treated sewage effluent from the Peny-Y-Bont, Merthyr Mawr WwTW, which discharges to the R. Ogmore immediately north-east of the SAC. Currently, it is unclear whether this WwTW serves any current development within the Vale of Glamorgan. AECOM will be liaising with Welsh Water to confirm this for the Deposit RLDP. The WwTW is situated in the authority of Bridgend and any wastewater infrastructure connecting to developments in the Vale of Glamorgan would need to cross the R. Ogmore. Furthermore, even if the WwTW serves parts of the Vale of Glamorgan, it is uncertain whether the RLDP will allocate development within the geographic area it serves. **At the time of writing, adverse effects of the Vale of Glamorgan RLDP on the Kenfig SAC regarding water quality impacts from treated sewage effluent cannot be excluded.** For the Deposit RLDP, the full suite of development allocations and associated sewerage connections will be assessed.

Negative water quality impacts may also occur due to surface runoff from hardstanding in close proximity to waterbodies. None of the Key Sites are located at distances to the Severn Estuary SAC / SPA / Ramsar and Kenfig SAC at which surface runoff is a material issue. However, to ensure protection from runoff-related water quality impacts, the full suite of allocations will be assessed in relation to their distance and hydrological connectivity with these European sites. **At the time of writing, adverse effects of the Vale of Glamorgan RLDP on the Severn Estuary SAC / SPA /**

Ramsar and Kenfig SAC regarding water quality impacts from surface runoff cannot be excluded. This conclusion will be reassessed in the Deposit RLDP HRA.

Water Quantity, Level and Flow

According to the Water Resources Management Plan (WRMP) published by Welsh Water, the Vale of Glamorgan is divided between two Water Resource Zones (WRZs; Tywi Gower and South-East Wales Conjunctive Use System), both of which have a forecast supply-demand deficit over the WRMP period. However, the AA highlights that the options required to address this supply-demand deficit will not require the use of any additional surface or groundwater sources beyond currently consented limits. Therefore, there is no potential for the Vale of Glamorgan RLDP to reduce the freshwater supplies to any European site. Overall, the RLDP will not lead to adverse effects on the Kenfig SAC and Severn Estuary SAC / SPA / Ramsar regarding impacts on water quantity, level and flow, either alone or in-combination.

Loss of Functionally Linked Habitat

The potential of the Key Sites allocated in the RLDP Preferred Strategy to be functionally linked to the Severn Estuary SPA / Ramsar was assessed. Data presented in the AA indicate that two Key Sites (Land North of Dinas Powys, Land at North East Barry) have medium-high suitability as off-site supporting habitat for SPA / Ramsar bird species. Additional site allocations are likely to be allocated in the Deposit RLDP, which will also require individual assessment.

To minimise the potential for the emerging RLDP to result in the loss of functionally linked habitat, it is recommended that the following text (or similar) is inserted to an appropriate policy of the Deposit Plan: '***To meet the requirements of the Conservation of Habitats and Species Regulations 2017 (as amended), the applicant is required to provide evidence that development will not result in adverse effects on the integrity of the Severn Estuary SPA / Ramsar regarding the loss of functionally linked habitat. To demonstrate this, a survey of the habitats on site is required. Where habitats are suitable, non-breeding bird surveys to determine whether the site constitutes functionally linked habitat (defined as supporting close to or above 1% of the any qualifying population) must be undertaken. These will need to cover autumn, winter and spring to capture the core overwintering as well as any passage periods. If habitat within the site is identified to support significant populations of designated bird species, avoidance measures and mitigation will be required, and the planning application will likely need to be assessed through a project-specific Habitats Regulations Assessment.***' Provided that this policy wording is included, it can be concluded that the Vale of Glamorgan RLDP does not result in adverse effects on the integrity of the Severn Estuary SPA / Ramsar regarding the loss of functionally linked habitat.

Visual and Noise Disturbance

Some areas in the east of the Vale of Glamorgan lie within 300m of the Severn Estuary SPA / Ramsar, the distance within which material visual and noise disturbance impacts to qualifying birds are likely to occur. While the Preferred Strategy RLDP does not allocate any Key Sites within this disturbance buffer zone, further site allocations will be coming forward under the Deposit RLDP. There is also the potential that windfall development will occur in the wider area around Penarth. To ensure that the qualifying species in the Severn Estuary SPA / Ramsar are protected from disturbance and adequate mitigation measures will be delivered at planning application level, it is recommended that a policy mechanism to this effect is included in the Deposit RLDP.

The following recommendations are made for the Deposit Plan RLDP, which will ensure that there are no adverse effects on the integrity of the Severn Estuary SPA / Ramsar regarding visual and noise disturbance (to be included either in the supporting text of a relevant policy or, in condensed format, in the policy text itself):

- ***To minimise the potential for visual and noise disturbance, it is recommended that any construction works within 300m of the Severn Estuary SPA / Ramsar are undertaken in the summer months, when qualifying populations in the site will not be present.***
- ***If construction works cannot be timed to avoid the non-breeding season (i.e. passage and winter periods), noise impact assessments will need to be undertaken to ensure that noise levels at sensitive receptors will remain non-disturbing. HRAs***

accompanying relevant planning applications would need to demonstrate this by either (a) using an absolute threshold of 69dB or (b) comparing construction noise levels to the pre-development baseline. Where construction-phase noise levels are shown to be disturbing, mitigation measures (e.g. noise screens, selection of less noisy construction techniques, damping / noise shielding of equipment, avoidance of lighting) are likely to be required.

- ***Construction works within 300m of any established high-tide roosts or key foraging areas within our outside the SPA / Ramsar should have appropriate screening in place to minimise visual disturbance.***

Coastal Squeeze

Development within the Vale of Glamorgan may be situated adjoining the Severn Estuary SAC / SPA / Ramsar, potentially resulting in coastal squeeze. However, as discussed in the AA, the overarching approach to coastal management is identified in the Severn Estuary Shoreline Management Plan (SMP). The Vale of Glamorgan coastline within Policy Unit PEN2 is already highly developed, with housing directly adjoining the Esplanade. Therefore, it is unlikely that the Vale of Glamorgan RLDP will allocate many developments on greenfield sites adjoining the estuary. Furthermore, as highlighted above, the overall management approach of Hold The Line (HTL) for this Policy Unit is dictated by the strategic SMP. Prior to its adoption, the SMP would have undergone HRA to assess whether it would result in adverse effects on the Severn Estuary SAC / SPA / Ramsar regarding coastal squeeze. For any coastal strategies for which adverse effects on intertidal habitats cannot be excluded, the Regional Habitat Compensation Programme (RHCP) is in place to deliver habitat compensation through Managed Realignment (MR) schemes. Overall, there will be no adverse effects of the Vale of Glamorgan RLDP on the Severn Estuary SAC / SPA / Ramsar regarding coastal squeeze. This is due to any HTL policy approaches being identified, assessed and compensated for at the SMP level.

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1. Introduction

1.1 The Vale of Glamorgan is Wales' most southerly Unitary Authority, situated to the west of Cardiff and sitting between the M4 and the Severn Estuary. The authority covers 33,097ha of which roughly 85% are agricultural land and 53km are open coastline (19km of Heritage Coast). Its neighbouring authorities are Bridgend, Cardiff and Rhondda Cynon Taf. The main transport corridors within the Vale of Glamorgan are the A48, which runs east to west through the Vale, linking Bridgend to Culverhouse Cross, and the A4426 / B4265 which links the coastal settlements to Barry. The A4232 forms the east boundary of the Vale, and links the authority with the M4 motorway to the north of the administrative boundary.

1.2 Vale of Glamorgan Council (VGC) is in the early stages of preparing its Replacement Local Development Plan (RLDP). It is a statutory requirement that Local Development Plans are reviewed every four years to ensure they are still fit for purpose. The adopted LDP was reviewed in June 2021 (and a LDP Review Report published), which resulted in a recommendation for a RLDP covering the years between 2021 and 2036 being made. The RLDP will shape the Vale of Glamorgan for the next 15 years, determining where certain types of development will be permitted and outlining areas that will be protected. It will also encompass strategic policies that will allocate major development sites (both housing and employment development) in the period to 2036. AECOM has been appointed by VGC to undertake the report to inform the Habitats Regulations Assessment (HRA) of the emerging RLDP. Effectively, the RLDP encompasses the policy framework against which individual planning applications will be assessed, consented or rejected.

1.3 VGC is a Competent Authority as defined in Regulation 7 of the Conservation of Habitats and Species Regulations 2017 (as amended). Regulation 105 states that '*A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which… is likely to have a significant effect on a European site [a Special Area of Conservation, Special Protection Area or, as a matter of Government policy, a Ramsar site] or a European offshore marine site (either alone or in combination with other plans or projects) …must make an appropriate assessment of the implications of the plan or project for that site in view of that site's conservation objectives*'. Collectively, this process is called HRA.

Legislative Context

1.4 The UK left the EU on 31 January 2020 under the terms set out in the European Union (Withdrawal Agreement) Act 2020 ("the Withdrawal Act"). However, the Withdrawal Act retains the body of existing EU-derived law within our domestic law. Therefore, the requirement for HRA continues as set out in the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019[2], unless this changes through future legislative amendments. Note that there are current Government plans to change the Habitats Regulations although how they may change is currently unclear. Similarly, although EU case law is currently still considered of relevance in the UK courts, this position may change during the plan preparation process or the RLDP period. Therefore, all stages of the HRA will need to be mindful of potential changes in legislation and caselaw.

1.5 The need for Appropriate Assessment is set out in the Conservation of Habitats and Species Regulations 2017 (as amended; **Error! Reference source not found.**). The HRA process a pplies the 'Precautionary Principle'[3] to European sites. Plans and projects can only be permitted having ascertained that there will be no adverse effect on the integrity of European site(s). Plans and projects with anticipated adverse impacts on the integrity of European sites may still be permitted if there are No Reasonable Alternatives (that would deliver the same objectives), Imperative Reasons of Overriding Public Interest (IROPI) and adequate compensation has been

[2] these don't replace the 2017 Regulations but are just another set of amendments
[3] The Precautionary Principle, which is referenced in Article 191 of the Treaty on the Functioning of the European Union, has been defined by the United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2005) as: *"When human activities may lead to morally unacceptable harm* [to the environment] *that is scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm. The judgement of plausibility should be grounded in scientific analysis".*

identified. To ascertain whether or not site integrity will be affected, an Appropriate Assessment (AA) should be undertaken of the plan or project in question:

> Conservation of Habitats and Species Regulations 2017 (As Amended)
>
> The Regulations state that:
> "A competent authority, before deciding to … give any consent for a plan or project which is likely to have a significant effect on a European site … shall make an appropriate assessment of the implications for the site in view of that sites conservation objectives… The authority shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site".

Figure 1: The legislative basis for Appropriate Assessment.

1.6 Over time the phrase 'Habitats Regulations Assessment' (HRA) has come into wide currency to describe the overall process set out in the Habitats Directive from screening through to IROPI. This has arisen to distinguish the overall process from the individual stage described in the law as AA.

1.7 In spring 2018 the 'Sweetman' European Court of Justice ruling[4] clarified that mitigation (i.e. measures that are specifically introduced to avoid or reduce a harmful effect on a European site that would otherwise arise) should **not** be taken into account when forming a view on LSEs. Mitigation should instead only be considered at the AA stage.

1.8 In 2018 the Court of Justice of the European Union (CJEU) also ruled in combined cases C-293/17 and C-294/17 (often dubbed the Dutch Nitrogen case). The case related to atmospheric nitrogen deposition from agriculture and the concept of 'headroom' for further deposition. The Dutch government argued that because other measures they were taking (through a national programme known as the PAS) would reduce atmospheric nitrogen deposition considerably, this would create headroom for agricultural growth, such that individual farms would not need AA or mitigation as long as they remained within that headroom. However, there was considerable uncertainty over the effectiveness of the PAS reductions, and even with these taken into account, large areas of the relevant European sites would still be above the Critical Load (i.e. the threshold below which damage could be ruled out with confidence). As a result, the Advocate-General advising the court disagreed with the Dutch Government due to the degree of uncertainty over the effectiveness of the PAS and argued that if the Critical Load was still exceeded, there was effectively no headroom available since damage would still arise from further deposition. In other words, to create sufficient headroom at a national level to entirely avoid the need for AA or mitigation, one would need to not just reduce nitrogen inputs from other sources but do so to such an extent the damage thresholds for the European site was no longer exceeded. The Court concurred, ruling that where a site is already in a negative state the room for permitting further harm is necessarily limited. The RLDP HRA will be mindful of these rulings.

Quality Assurance

1.9 This report was undertaken in line with AECOM's Integrated Management System (IMS). Our IMS places great emphasis on professionalism, technical excellence, quality, environmental and Health and Safety management. All staff members are committed to establishing and maintaining our certification to the international standards BS EN ISO 9001:2008 and 14001:2004 and BS OHSAS 18001:2007. In addition, our IMS requires careful selection and monitoring of the performance of all sub-consultants and contractors.

1.10 All AECOM Ecologists working on this project are members (at the appropriate level) of the Chartered Institute of Ecology and Environmental Management (CIEEM) and follow their code of professional conduct (CIEEM, 2019).

[4] People Over Wind and Sweetman v Coillte Teoranta (C-323/17)

2. Methodology

2.1 The HRA will be carried out with reference to the general EC guidance on HRA[5]; the UK government has also produced its own guidance[6]. These will be referred to in undertaking this HRA. **Error! Reference source not found.** below outlines the stages of HRA according to this g uidance. The stages are essentially iterative, being revisited as necessary in response to more detailed information, recommendations and any relevant changes to the plan until no significant adverse effects remain.

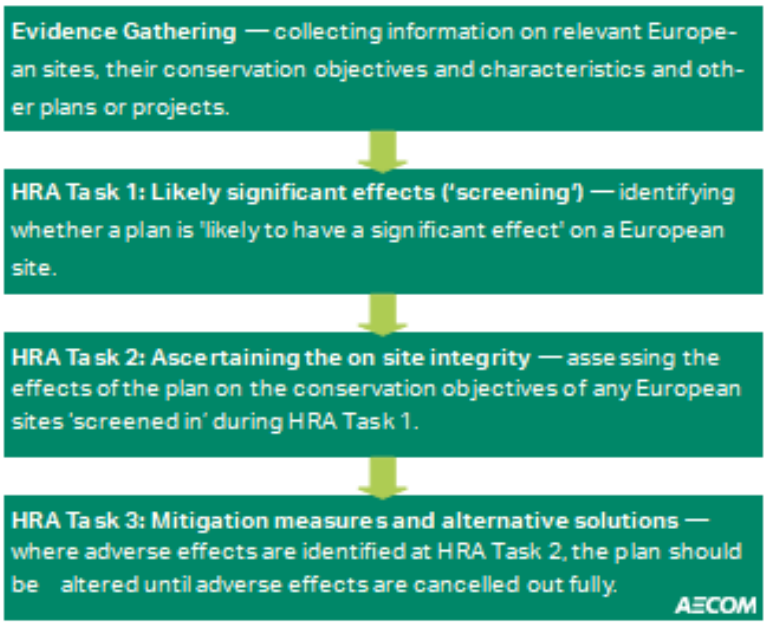

Figure 2: Four Stage Approach to Habitats Regulations Assessment. Source EC, 2001[1].

Description of HRA Tasks

HRA Task 1 – Screening for Likely Significant Effects (LSEs)

2.2 Following evidence gathering, the first stage of any HRA is a screening for LSEs. This is a brief, high-level assessment to decide whether the full subsequent stage known as AA is required. The essential question is:

”Is the project, either alone or in combination with other relevant projects and plans, likely to result in a significant effect upon European sites?”

2.3 The objective is to ‘screen out’ those plans and projects that can, without any detailed appraisal, be concluded to be unlikely to result in significant adverse effects upon European sites. This is usually because there is no mechanism for an adverse interaction. The LSEs screening is based on identification of impact sources, potential pathways linking to ecological receptors and assessment of relevant European sites at risk from development. These are normally designated features but also include habitats and species fundamental to those designated features achieving favourable conservation status (notably functionally linked habitats outside European site boundaries).

[5] European Commission (2001): Assessment of plans and projects significantly affecting Natura 2000 Sites: Methodological Guidance on the Provisions of Article 6(3) and 6(4) of the Habitats Directive.
[6] https://www.gov.uk/guidance/habitats-regulations-assessments-protecting-a-european-site

2.4 In the Waddenzee case[7], the European Court of Justice ruled on the interpretation of Article 6(3) of the Habitats Directive, including that:

- An effect should be considered 'likely', "*if it cannot be excluded, on the basis of objective information, that it will have a significant effect on the site*" (para 44);
- An effect should be considered 'significant', "*if it undermines the conservation objectives*" (para 48); and
- Where a plan or project has an effect on a site "*but is not likely to undermine its conservation objectives, it cannot be considered likely to have a significant effect on the site concerned*" (para 47).

2.5 Therefore, the LSEs screening consists of two parts: Firstly, it determines whether there are any policies that could result in negative impacts on ecological receptors and secondly it evaluates whether there are any European sites that might be affected. This Scoping Report identifies European sites that could be affected by the RLDP and the impact pathways most likely requiring consideration.

2.6 Due to the aforementioned 2018 case law, the conclusion of 'no LSEs' must not take account of any measures specifically introduced to avoid or reduce harm to European sites. Embedded measures (i.e. those that are integral to the plan itself) can be considered at this stage but other types of mitigation must be deferred to the AA. It is also important to note that the LSEs screening must generally follow the Precautionary Principle as its main purpose is to determine whether the subsequent stage of AA (i.e. a more detailed investigation) is required.

HRA Task 2 – Appropriate Assessment (AA)

2.7 Where it is determined that LSEs cannot be excluded, the analysis must proceed to the next stage of HRA known as AA. Case law has clarified that 'Appropriate Assessment' is not a technical term. In other words, there are no particular technical analyses, or level of technical analysis, that are classified by law as belonging to AA rather than the screening for LSEs. AA refers to whatever level of assessment is appropriate to form a conclusion regarding effects on the integrity (coherence of structure and function) of European sites in light of their Conservation Objectives.

2.8 There is a clear implication that the analysis in the AA should be more detailed than undertaken at the LSEs stage. One of the key considerations in the AA is whether there is available mitigation that would entirely address the potential effect. In practice, the AA takes any policies or allocations that could not be dismissed following the high-level LSEs screening and assesses the potential for an effect in more detail. The purpose is to conclude whether there would actually be an adverse effect on site integrity (in other words, disruption of the coherent structure and function of European site(s)). In evaluating significance, AECOM will rely on professional judgement, interpretation of bespoke studies and previous stakeholder consultation regarding potential impacts of development.

2.9 In 2018 the Holohan ruling[8] was handed down by the European Court of Justice. This included paragraph 39 which stated that 'As regards other habitat types or species, which are present on the site, but for which that site has not been listed, and with respect to habitat types and species located outside that site, … typical habitats or species must be included in the appropriate assessment, if they are necessary to the conservation of the habitat types and species listed for the protected area' [emphasis added]. This is particularly important regarding the potential loss of functionally linked habitat in relation to the Severn Estuary SPA / Ramsar.

2.10 Where necessary, measures will be recommended for incorporation into the emerging RLDP to avoid or mitigate adverse effects on European sites. There is considerable precedent, both nationally and locally, concerning the level of detail that a Plan document needs to contain regarding mitigation of identified impact pathways, such as recreational pressure. The implication of this is that it is not necessary for all measures to be fully deployed or developed prior to adoption of the RLDP, but the planning document must provide an adequate policy framework

[7] Case C-127/02
[8] Case C-461/17

within which these measures can be delivered. When discussing mitigation at a strategic plan level, one is concerned primarily with the policy framework to enable the delivery of such mitigation rather than the detail of the mitigation measures themselves.

HRA Task 3 – Avoidance and Mitigation

2.11 Once the AA has been completed there may be a requirement for avoidance or mitigation. This will most likely encompass suggestions for amendments to policy wording, or the identification of strategic mitigation solutions for smaller sites unlikely to be able to deliver their own mitigation. The purpose is to ensure an adequate framework exists to protect European sites from any potential adverse effects.

2.12 Consideration should also be given to the role of any new legal requirements that may emerge during the RLDP process. Delivering land to achieve Biodiversity Net Gain could potentially be co-located with mitigation solutions required for recreational pressure, such as by increasing the amount of available recreational greenspace and delivering significant biodiversity enhancements at the same time. For example, a country park could be zoned to provide both considerable biodiversity benefits and significant recreational opportunity. Moreover, any large area of Biodiversity Net Gain is likely to be informally used for recreation unless steps are taken to physically exclude the general public. To achieve this dual benefit, any proposed site for co-location would need to be large and meet formal SANG or Heathland Infrastructure Project (HIP) criteria[9].

2.13 There is significant value in committing to building a strong network of greenspaces, large parks and accessible Green / Blue Infrastructure corridors in the RLDP process from the outset, located appropriately to draw new residents away from sensitive European sites. This is likely to be required in addition to working with landowners and managers of designated sites to address the direct effects of increased recreational pressure within the site boundaries. At other European sites for which recreational pressure is a concern, the latter is often achieved through providing Strategic Access Management & Monitoring (SAMM), although landowner involvement is essential.

2.14 Department for Levelling Up, Housing & Communities (DLUHC) and Ministry of Housing, Communities and Local Government (MHCLG) guidance[10] makes it clear that when undertaking HRAs of land-use plans, the AA should be undertaken at a level of detail that is appropriate and proportional to the level of detail provided within the plan itself:

- "*The comprehensiveness of the [Appropriate] assessment work undertaken should be proportionate to the geographical scope of the option and the nature and extent of any effects identified. An AA need not be done in any more detail, or using more resources, than is useful for its purpose. It would be inappropriate and impracticable to assess the effects [of a strategic land use plan] in the degree of detail that would normally be required for the Environmental Impact Assessment (EIA) of a project.*"

- The Court of Appeal[11] ruled that providing the Council (in their role as Competent Authority) was duly satisfied that proposed mitigation could be '*achieved in practice*' to satisfy that the proposed development would have no adverse effect, then this would suffice. This ruling has since been applied to a planning permission (rather than a Local Plan)[12]. In that case the High Court ruled that for *'a multistage process, so long as there is sufficient information at any particular stage to enable the authority to be satisfied that the proposed mitigation can be achieved in practice it is not necessary for all matters concerning mitigation to be fully resolved before a decision maker is able to conclude that a development will satisfy the requirements of Regulation 102 of the Habitats Regulations*'.

2.15 The same principle has also been applied in Buckinghamshire with regard to the former Wycombe District Local Plan. In paragraph 175 of his ruling in case [2020] EWHC 1984 (Admin),

[9] https://www.woking2027.info/allocations/sadpdexam/neguidelinessang
[10] Department for Levelling up, housing and communities 2019. Guidance on Appropriate assessment https://www.gov.uk/government/organisations/department-for-levelling-up-housing-and-communities https://www.gov.uk/guidance/appropriate-assessment [accessed 17/11/2022]
[11] No Adastral New Town Ltd (NANT) v Suffolk Coastal District Council Court of Appeal, 17th February 2015
[12] High Court case of R (Devon Wildlife Trust) v Teignbridge District Council, 28 July 2015

2020 WL 04248573 (Keep Bourne End Green v Buckinghamshire Council (formerly Wycombe District Council), The Secretary of State for Housing, Communities and Local Government v Catesby Estates Plc, Leopold Noe) when a policy in this plan was challenged for being insufficiently detailed regarding mitigation for European sites, Mr Justice Holgate noted that '*I accept the Council's submission that, as a matter of law, the wording of Policy BE2 did not need to go further* [and provide full details regarding the mitigation for impacts on a European site that would be required]. *It was appropriate for the Plan as a development plan forming part of a multi-stage decision-making process, which includes a more detailed application for the grant of a development consent and a further HRA at that point. It was sufficient for the examination and adoption of the Plan that there was sufficient information before the Council enabling it to be satisfied, as it was, that the proposed mitigation could be achieved in practice… The requirement of s.106 contributions to a "suitable natural alternative green space" ("SANG") is a well-established form of mitigation under the 2017 Regulations for dealing with recreational pressure on a European protected site. The wording of Policy BE2, understood within the multi-stage nature of the statutory scheme, complies with the requirements of the Habitats Directive.'*

2.16 In other words, there is an acceptance that AA can be tiered and that all impacts are not necessarily appropriate for consideration to the same degree of detail at all tiers. The fullest level of detail is required at the reserved matters or full planning application stage that it is '*sufficiently certain that a measure will make an effective contribution to avoiding harm, guaranteeing beyond all reasonable doubt that the project will not adversely affect the integrity of the area'*, as per Cooperatie Mobilisation [2019] Env LR (CSFG§97).

2.17 Similarly, in any strategic planning document, there are numerous policies for which there is a limit to the degree of assessment that is possible at this level. This is because either:

- The policy in question does not contain any specifics as to what will be delivered so cannot be assessed in detail at the plan level. In this case, the AA would focus on precautionary mitigation that can be included in the plan to ensure that whatever proposals come forward will not result in adverse effects on integrity; or
- The nature of the potential impacts (notably lighting, noise and visual disturbance during construction, or loss of functionally linked habitat) are very closely related to exactly where and how the development will be delivered. Therefore, these impact pathways cannot be assessed in detail at the plan level. In these instances, the AA centres around available mitigation measures, the extent to which such measures would be achievable / effective and whether an adequate protective policy framework exists to ensure that development coming forward under the relevant policies will not lead to adverse effects on the integrity of European sites.

2.18 On these occasions the advice of Advocate-General Kokott[13] is worth considering. She commented that: *'It would …hardly be proper to require a greater level of detail in preceding plans* [rather than planning applications] *or the abolition of multi-stage planning and approval procedures so that the assessment of implications can be concentrated on one point in the procedure. Rather, adverse effects on areas of conservation must be assessed at every relevant stage of the procedure* ***to the extent possible on the basis of the precision of the plan***. ***This assessment is to be updated with increasing specificity in subsequent stages of the procedure'*** [emphasis added]. This is the approach taken in the HRA and is in line with the Department for Levelling Up Housing and Communities guidance referenced in paragraph 4.27, and Court rulings that regarding level of detail of the assessment which is appropriate at each stage of the planning process.

In-Combination Assessment

2.19 It is a requirement of the Regulations that the impacts and effects of any plan document are not only considered in isolation but in-combination with other plans and projects that may also be exerting pressures on the relevant European site(s). In practice, in-combination assessment is of greatest importance when a policy would otherwise be screened out because its individual

[13] Opinion of Advocate General Kokott, 9th June 2005, Case C-6/04. Commission of the European Communities v United Kingdom of Great Britain and Northern Ireland, paragraph 49
http://curia.europa.eu/juris/document/document.jsf?docid=58359&doclang=EN

contribution is not significant. Table 1 summarises the key strategic Local Development Plans with the potential for in-combination impacts with the Vale of Glamorgan RLDP.

Table 1: Strategic development plans with the potential for in-combination effects due to proximity to the Vale of Glamorgan and relevant European sites.

Strategic Plan	Residential Growth	Employment Growth
Bridgend County Borough Local Development Plan 2018-2033[14]	9,207 dwellings (prioritised on previously developed land)	71.7ha
Rhondda Cynon Taf Local Development Plan 2006-2021[15]	14,385 dwellings (in sustainable locations)	51ha
Cardiff Local Development Plan 2006-2026[16]	45,415 dwellings	N/A (no hectarage provided, but 40,000 new jobs to be delivered)

2.20 At the level of strategic development plans, such as RLDPs, it is the total in-combination growth quantum that is the primary focus of assessment rather than the detail of individual allocations (which will be assessed through their own HRA at the planning application level). Individual planning applications are only considered in the in-combination assessment where they have national significance or are particularly extensive. For example, a development delivering 500 dwellings or more would need to be considered in an appraisal of cumulative recreational pressure impacts.

2.21 Notwithstanding this, when undertaking in-combination assessment for specific development sites, it is important to avoid double-counting since housing and employment projects that deliver growth will usually themselves be part of the strategic plan as site allocations. In these instances, the development of a planning application can be considered to provide further detail on growth that is already being assessed. Similarly, where growth is being delivered in surrounding authorities this is captured in the in-combination assessment through consideration of the relevant adopted LDPs or emerging RLDPs, which set out the total amount of growth delivered across the authorities over the relevant timescales.

Geographical Scope

2.22 There are no standard criteria for determining the physical scope of an HRA. Rather, the source-pathway-receptor model should be used to determine whether there are potential linking impact pathways connecting to development allocated in the plan document. Based on an assessment of the available evidence, the following European sites were included in the scope of assessment (see Appendix A for a map showing their distribution in relation to the Vale of Glamorgan):

- Severn Estuary SAC / SPA / Ramsar;
- Dunraven Bay SAC;
- Kenfig SAC;
- Cardiff Beech Woods SAC;
- Cefn Cribwr Grasslands SAC; and,
- Blackmill Woodlands SAC.

[14] Bridgend County Borough Local Development Plan. Deposit Consultation Document. Available at: https://www.bridgend.gov.uk/media/10937/consultation-document.pdf [Accessed 07 September 2023]
[15] Rhondda Cynon Taf Local Development Plan. (Adopted March 2011). Available at: https://www.rctcbc.gov.uk/EN/Resident/PlanningandBuildingControl/LocalDevelopmentPlans/RelateddocumentsLDP20062021/AdoptedLocalDevelopmentPlan.pdf [Accessed 07 September 2023]
[16] Cardiff Local Development Plan. (Adopted January 2016). Available at: https://www.cardiffldp.co.uk/wp-content/uploads/Final-Adopted-Local-Development-Plan-English.pdf [Accessed 07 September 2023]

2.23 To fully inform this HRA, several reports, studies and databases were consulted to determine whether LSEs and, potentially, adverse effects may arise from the Vale of Glamorgan RLDP. These include:

- LDPs and accompanying HRAs (where available) for the adjoining authorities of Bridgend, Rhondda Cynon Taf and Cardiff;
- Visitor survey undertaken by AECOM on the Welsh side of the Severn Estuary SAC / SPA / Ramsar for the authorities of Monmouthshire and Torfaen;
- Water Resources Management Plan (WRMP) published by Welsh Water and its associated HRA;
- Countryside Council for Wales' (now Natural Resources Wales) Core Management Plans for all relevant European sites; and
- Multi Agency Geographic Information for the Countryside (MAGIC) and its links to SSSI citations and the JNCC website (www.magic.gov.uk).

3. European Sites

3.1 In the case of the Vale of Glamorgan RLDP, it was determined that for the initial coarse screening European sites within 15km of the authority boundary require consideration (**Error! Reference s ource not found.**). Their geographic location is illustrated in **Appendix A, Figure A1**.

Table 2: Relevant European sites and their location in relation to the Vale of Glamorgan.

European site	Location
Severn Estuary SAC / SPA / Ramsar	This is an extensive estuarine site that stretches along the eastern side of the authority boundary and also directly adjoins Cardiff, Newport and Monmouthshire.
Dunraven Bay SAC	This SAC lies in the western part of the authority.
Kenfig SAC	The site is located immediately north of the Vale of Glamorgan in the adjoining authority of Bridgend.
Cardiff Beech Woods SAC	The closest component part of this SAC to the Vale of Glamorgan lies approx. 3.5km to the north-east in the adjoining authority of Cardiff.
Cefn Cribwr Grasslands SAC	The closest component part of the Cefn Cribwr Grasslands SAC lies approx. 5.2km to the north in the adjoining authority of Bridgend.
Blackmill Woodlands SAC	The closest component part of this SAC to the Vale of Glamorgan lies approx. 6km to the north in the adjoining authority of Bridgend.

Severn Estuary SAC

Introduction

3.2 The Severn Estuary SAC was designated as a SAC in 2009, because it supports a significant number of habitats and species. It covers an area of 74,000ha and is designated partly for its estuary feature. Within this feature, subtidal sandbanks, intertidal mudflats and sandflats, Atlantic salt meadows and biogenic reefs are included. The SAC also harbours three migratory fish species, including river lamprey, sea lamprey and twaite shad. The Severn Estuary also comprises hard substrate habitats, an assemblage of 114 estuarine and marine fish species and various waterfowl species. The Severn Estuary SAC overlaps with the Severn Estuary SPA / Ramsar, designated for a range of overwintering waders and waterfowl.

Qualifying Features[17]

3.3 Annex I habitats that are a primary reason for selection of this site:

- Estuaries
- Mudflats and sandflats not covered by seawater at low tide
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

3.4 Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:

- Sandbanks which are slightly covered by sea water all the time
- Reefs

3.5 Annex II species that are a primary reason for selection of this site:

- Sea lamprey *Petromyzon marinus*

[17] https://sac.jncc.gov.uk/site/UK0013030 [Accessed on the 25/04/2023]

- River lamprey *Lampetra fluviatilis*
- Twaite shad *Alosa fallax*

Conservation Objectives[18]

3.6 With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

3.7 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- The extent and distribution of qualifying natural habitats and habitats of qualifying species
- The structure and function (including typical species) of qualifying natural habitats
- The structure and function of the habitats of qualifying species
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- The populations of qualifying species, and,
- The distribution of qualifying species within the site.

Threats and Pressures to Site Integrity[19]

3.8 The following threats and pressures to the site integrity of the Severn Estuary SAC have been identified in Natural England's Site Improvement Plan:

- Public access / disturbance
- Physical modification
- Impacts of development
- Coastal squeeze
- Change in land management
- Changes in species distributions
- Water pollution
- Air pollution: Impact of atmospheric nitrogen deposition
- Marine consents and permits: Minerals and waste
- Fisheries: Recreational marine and estuarine
- Fisheries: Commercial marine and estuarine
- Invasive species
- Marine litter
- Marine pollution incidents

[18] http://publications.naturalengland.org.uk/publication/6081105098702848 [Accessed on the 25/04/2023]
[19] http://publications.naturalengland.org.uk/publication/4590676519944192 [Accessed on the 25/04/2023]

Severn Estuary SPA / Ramsar

Introduction

3.9 The Severn Estuary SPA / Ramsar is located between the borders of Wales and England in south-western Britain. It is a 24,700.91ha large estuary with extensive intertidal mudflats, sandflats, rocky platforms and small islands. The coastline is fringed by saltmarsh, grazing marsh, freshwater and brackish ditches. Its seabed is mainly rocky, gravelly and sub-tidal sandbanks. Due to the estuary's funnel shape, the Severn experiences the second highest tidal range in the world.

3.10 Because of this extreme tidal condition, the SPA / Ramsar is inhabited by plant and animal assemblages that tolerate the physical conditions in the tidal-swept liquid mud, sand and rock. The invertebrate community is species-poor and harbours high densities of ragworms and lugworms. These form important food sources for migrant and wintering waders. The SPA / Ramsar has particular importance as a stopover point for spring and autumn migrant waders, and overwintering swans, ducks and waders. The site also has an extensive intertidal zone, as a consequence of its tidal range.

SPA Qualifying Features[20]

3.11 This site qualifies under **Article 4.1** of the Directive (79/409/EEC) by supporting populations (counts are all at time of designation and could have changed since) of European importance of the following species listed on Annex I of the Directive:

Over winter

- Bewick's swan *Cygnus columbianus bewickii*, 280 individuals representing at least 4.0% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6)

3.12 This site also qualifies under **Article 4.2** of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:

On passage

- Ringed plover *Charadrius hiaticula*, 655 individuals representing at least 1.3% of the Europe/Northern Africa - wintering population (5 year peak mean 1991/2 - 1995/6)

Over winter

- Curlew *Numenius arquata*, 3,903 individuals representing at least 1.1% of the wintering Europe - breeding population (5 year peak mean 1991/2 - 1995/6)
- Dunlin *Calidris alpina alpina*, 44,624 individuals representing at least 3.2% of the wintering Northern Siberia/Europe/Western Africa population (5 year peak mean 1991/2 - 1995/6)
- Pintail *Anas acuta*, 599 individuals representing at least 1.0% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6)
- Redshank *Tringa totanus*, 2,330 individuals representing at least 1.6% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6)
- Shelduck *Tadorna tadorna*, 3,330 individuals representing at least 1.1% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6)

Assemblage qualification: A wetland of international importance

3.13 The area qualifies under **Article 4.2** of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl.

3.14 Over winter, the area regularly supports 93,986 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: Gadwall *Anas strepera*, shelduck *Tadorna tadorna*, pintail *Anas acuta*, dunlin

[20] http://archive.jncc.gov.uk/default.aspx?page=2066 [Accessed on the 25/04/2023]

Calidris alpina alpina, curlew *Numenius arquata*, redshank *Tringa totanus*, Bewick's swan *Cygnus columbianus bewickii*, wigeon *Anas penelope*, lapwing *Vanellus vanellus*, teal *Anas crecca*, mallard *Anas platyrhynchos*, shoveler *Anas clypeata*, pochard *Aythya ferina*, tufted duck *Aythya fuligula*, grey plover *Pluvialis squatarola*, white-fronted goose *Anser albifrons albifrons*, whimbrel *Numenius phaeopus*.

Ramsar Qualifying Features[21]

3.15 The Severn Estuary is designated as a Ramsar site under the following criteria:

Criterion 1

Due to the immense tidal range (second-largest in world), which affects both the physical environment and biological communities

Habitats Directive Annex I features present include sandbanks which are slightly covered by sea water all the time, estuaries, mudflats and sandflats not covered by sweater at low tide and Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

Criterion 3

Due to unusual estuarine communities, reduced diversity and high productivity

Criterion 4

This site is important for the run of migratory fish between sea and river via estuary. Species include salmon *Salmo salar*, sea trout *S. trutta*, sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, allis shad *Alosa alosa*, twaite shad *A. fallax*, and eel *Anguilla anguilla*. It is also of particular importance for migratory birds during spring and autumn.

Criterion 5: Assemblages of international importance

Species with peak counts in winter

70,919 waterfowl (5 year peak mean 1998/99-2002/2003).

Criterion 6: Species / populations occurring at levels of international importance

Species with peak counts in winter

- Tundra swan *Cygnus columbianus bewickii*; 229 individuals representing an average of 2.8% of the GB population (5 year peak mean 1998/99-2002/03)
- Greater white-fronted goose *Anser albifrons*; 2,076 individuals representing an average of 35.8% of the GB population (5 year peak mean 1996/97-2000/01)
- Common shelduck *Tadorna tadorna*; 3,223 individuals representing an average of 1% of the NW Europe population (5 year peak mean 1998/99-2002/03)
- Gadwall *Anas strepera strepera*; 241 individuals representing an average of 1.4% of the GB population (5 year peak mean 1998/99-2002/03)
- Dunlin *Calidris alpina alpina*; 25,082 individuals representing an average of 1.8% of the W Siberia and W Europe population (5 year peak mean 1998/99-2002/03)
- Common redshank *tringa totanus tetanus*; 2,616 individuals representing an average of 1% of the population (5 year peak mean 1998/99-2002/03)

Species / populations identified subsequent to designation for possible future consideration under criterion 6

Species regularly supported during the breeding season

[21] https://jncc.gov.uk/jncc-assets/RIS/UK11081.pdf [Accessed on the 25/04/2023]

- Lesser black-backed gull *Larus fuscus graellsii*; 4,167 apparently occupied nests, representing an average of 2.8% of the breeding population (Seabird 2000 Census)

Species with peak counts in spring / autumn

- Ringed plover *Charadrius hiaticula*; 740 individuals representing an average of 1% of the Europe and NW Africa population (5 year peak mean 1998/99-2002/03)

Species with peak counts in winter

- Eurasian teal *Anas crecca*; 4,456 individuals representing an average of 1.1% of the NW Europe population (5 year peak mean 1998/99-2002/03)
- Northern pintail *Anas acuta*; 756 individuals representing an average of 1.2% of the NW Europe population (5 year peak mean 1998/99-2002/03)

Criterion 8

The fish of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded. Salmon *Salmo salar*, sea trout *S. trutta*, sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, allis shad *Alosa alosa*, twaite shad *A. fallax*, and eel *Anguilla anguilla* use the Severn Estuary as a key migration route to their spawning grounds in the many tributaries that flow into the estuary. The site is important as a feeding and nursery ground for many fish species particularly allis shad *Alosa alosa* and twaite shad *A. fallax* which feed on mysid shrimps in the salt wedge.

SPA Conservation Objectives[22]

3.16 With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change;

3.17 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- The extent and distribution of the habitats of the qualifying features
- The structure and function of the habitats of the qualifying features
- The supporting processes on which the habitats of the qualifying features rely
- The population of each of the qualifying features, and,
- The distribution of the qualifying features within the site.

Threats and Pressures to Site Integrity of SPA[23]

3.18 The following threats and pressures to the site integrity of the Severn Estuary SPA have been identified in Natural England's Site Improvement Plan:

- Public access / disturbance
- Physical modification
- Impacts of development
- Coastal squeeze
- Change in land management
- Changes in species distributions
- Water pollution

[22] http://publications.naturalengland.org.uk/publication/5601088380076032 [Accessed on the 25/04/2023]
[23] http://publications.naturalengland.org.uk/publication/4590676519944192 [Accessed on the 25/04/2023]

- Air pollution: Impact of atmospheric nitrogen deposition
- Marine consents and permits: Minerals and waste
- Fisheries: Recreational marine and estuarine
- Fisheries: Commercial marine and estuarine
- Invasive species
- Marine litter
- Marine pollution incidents

Dunraven Bay SAC

Introduction

3.19 The Dunraven Bay SAC is a 6.45ha large site comprising a range of habitats, including shingle / sea cliffs (26.5%), humid / mesophile grassland (25%), dry grassland / steppes (18.5%), improved grassland (17.5%) and broad-leaved deciduous woodland (12.5%). The site is situated on a southwest facing cliff about 1km south-east of the village of Southerndown in the Vale of Glamorgan. Due to the eroding nature of the coastline, the SAC population has now declined to six individuals due to cliff slides removing plants.

3.20 Its shore dock population of approx. 20 individual plants is the reason for designation of this site. The species lives on damp coastal limestone and is the only remnant of the former Bristol Channel range. The primary causal factor for the disappearance of this species at other sites is the disappearance of damp dune slacks and shingle banks. For this reason, the Dunraven Bay population is a significant seed source for potential recolonisation of dunes and beach heads in the Bristol Channel, once the supporting habitats have been restored to favourable condition.

Qualifying Features[24]

3.21 Annex II species that are a primary reason for selection of this site:

- Shore dock *Rumex rupestris*

Conservation Objectives[25]

3.22 The conservation status of a natural habitat is the sum of the influences acting on it and its typical species that may affect its long-term natural distribution, structure and functions as well as the long term survival of its typical species. The conservation status of a natural habitat will be taken as favourable when:

- Its natural range and areas it covers within that range are stable or increasing, and
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- The conservation status of its typical species is favourable.

3.23 The conservation status of a species is the sum of the influences acting on the species that may affect the long-term distribution and abundance of its populations. The conservation status will be taken as 'favourable' when:

- Population dynamics data on the species indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and

[24] Available at: https://sac.jncc.gov.uk/site/UK0030139 [Accessed on the 26/04/2023]
[25] Available at: https://naturalresources.wales/media/671785/Dunraven%20Core%20SAC%20plan%2015.4.08.pdf [Accessed on the 26/04/2023]

- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Threats / Pressures to Site Integrity[26]

3.24 The Countryside Council Wales (CCW) specifies the following threats and pressures to the integrity of the Dunraven Bay SAC in the Core Management Plan for the site:

- Erosion and cliff fall
- Scrub

Kenfig SAC

Introduction

3.25 The Kenfig SAC is an extensive site covering 1,189.14ha and comprising a diverse range of habitats, including coastal sand dunes / sand beaches (63%), tidal rivers / estuaries (19%), heath / scrub (7.5%), shingle / sea cliffs (4%), inland waterbodies (2.5%), broad-leaved deciduous woodland (2.5%), salt marshes / salt pastures (1%) and bogs / marshes (0.5%). Owing to its ecological complexity, the SAC is designated for a range of habitats.

3.26 Kenfig represents a largely intact dune system in south Wales with extensive sections of fixed dune vegetation, comprising red fescue *Festuca rubra* and lady's bedstraw *Galium verum*. Semi-fixed dune grassland with marram *Ammophila arenaria* is also present. More acidic vegetation within this habitat includes sand sedge *Carex arenaria*, sheep's-fescue *Festuca ovina* and common bent *Agrostis capillaris*.

3.27 Humid dune slacks are another dune habitat type found within the SAC, which supports the most important example of this habitat in the UK, both in terms of its conservation, structure and function. These calcareous slacks are also among the most species-rich in the UK, supporting assemblages of fen orchid *Liparis loeselii* and various mosses. Some of the dune slacks within the site are still in the early successional stage of development.

Qualifying Features[27]

3.28 Annex I habitats that are a primary reason for selection of this site:

- Fixed coastal dunes with herbaceous vegetation ('grey dunes') (* priority feature)
- Dunes with *Salix repens* ssp. *Argentea* (*Salicion arenariae*)
- Humid dunes slacks
- Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.

3.29 Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:

- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

3.30 Annex II species that are a primary reason for selection of this site:

- Petalwort *Petalophyllum ralfsii*
- Fen orchid *Liparis loeselii*

[26] Ibid.
[27] Available at: https://sac.jncc.gov.uk/site/UK0012566 [Accessed on the 26/04/2023]

Conservation Objectives[28]

3.31 The conservation status of a natural habitat is the sum of the influences acting on it and its typical species that may affect its long-term natural distribution, structure and functions as well as the long term survival of its typical species. The conservation status of a natural habitat will be taken as favourable when:

- Its natural range and areas it covers within that range are stable or increasing, and
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- The conservation status of its typical species is favourable.

3.32 The conservation status of a species is the sum of the influences acting on the species that may affect the long-term distribution and abundance of its populations. The conservation status will be taken as 'favourable' when:

- Population dynamics data on the species indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Threats / Pressures to Site Integrity[29]

3.33 The following factors affecting the Kenfig SAC are specified in Countryside Council Wales' Core Management Plan for the site:

- Livestock grazing
- Water level
- Water quality
- Natural coastal processes
- Recreational and visitor pressure
- Scrub encroachment
- Air quality
- Agricultural runoff
- Hydrology
- Fishery management
- Introduced alien / exotic species
- Changes in access and recreation
- River bank erosion / sediment deposition
- Trampling by horses
- Pollution

[28] Available at: https://naturalresources.wales/media/672610/Kenfig%20SAC%20management%20plan%2021.4.08%20English.pdf [Accessed on the 26/04/2023]
[29] Ibid.

- *Frankenia laevis*

Cardiff Beech Woods SAC

Introduction

3.34 The Cardiff Beech Woods SAC is a 114.45ha large site comprising broad-leaved deciduous woodland (99.5%) and some developed tracts (0.5%). It represents an area of semi-natural broadleaved woodland dominated by beech. The SAC is considered one of the best examples of beech forest in the UK, representing this habitat close to its western limit of distribution. Mosaics and transitions to other woodland types are found throughout the SAC, such as acidic beech woodland and oak *Quercus* and ash *Fraxinus excelsior* woods. Characteristic and notable species in the ground flora include ramsons *Allium ursinum*, sanicle *Sanicula europea*, bird's-nest orchid *Neottia nidus-avis* and yellow bird's-nest orchid *Monotropa hypopitis*.

3.35 The SAC also supports significant stretches of *Tilio-Acerion* forests of slopes, screes and ravines, comprising ash *Fraxinus excelsior*, wych elm *Ulmus glabra* and small-leaved lime *Tilia cordata*. Introduced sycamore *Acer pseudoplatanus* is frequently present throughout.

Qualifying Features[30]

3.36 Annex I habitats that are a primary reason for selection of this site:

- *Asperulo-Fagetum* beech forests

3.37 Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:

- *Tilio-Acerion* forests of slopes, screes and ravines (* priority feature)

Conservation Objectives[31]

3.38 The conservation status of a natural habitat is the sum of the influences acting on it and its typical species that may affect its long-term natural distribution, structure and functions as well as the long term survival of its typical species. The conservation status of a natural habitat will be taken as favourable when:

- Its natural range and areas it covers within that range are stable or increasing, and
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- The conservation status of its typical species is favourable.

3.39 The conservation status of a species is the sum of the influences acting on the species that may affect the long-term distribution and abundance of its populations. The conservation status will be taken as 'favourable' when:

- Population dynamics data on the species indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

[30] https://sac.jncc.gov.uk/site/UK0030109 [Accessed on the 25/04/2023]
[31] https://naturalresources.wales/media/672066/FINAL%20Cdf%20Beech%20Woods%20SAC%20Man%20Plan.pdf [Accessed on the 25/04/2023]

Threats / Pressures to Site Integrity[32]

3.40 The following performance indicators for factors affecting the Cardiff Beech Woods SAC are specified in CCW's Core Management Plan:

- Recreational use
- Atmospheric pollution
- Development pressure
- Commercial forestry
- Mineral extraction

Cefn Cribwr Grasslands SAC

Introduction

3.41 The Cefn Cribwr Grasslands SAC is a 57.92ha large site encompassing humid / mesophile grassland (64%), broad-leaved deciduous woodland (25%), heath / scrub (10%) and bogs / marshes (1%). The SAC represents one of four sites selected in south and central Wales to support *Molinia* meadows. Within the site there are extensive stands of *Molinia – Cirsium dissectum* fen-meadow (M24) with cross-leaved heath *Erica tetralix*. Transitions to more acidic *Molinia* and *Juncus* pasture, dry neutral grassland and wet scrub vegetation are well represented. Notable declining species within the SAC are wiper's-grass *Scorzonera humilis* and soft-leaved sedge *Carex montana*.

3.42 Another feature of conservation importance within the site are the marsh fritillary populations, a species that is considered endangered in Europe. The occurrence of the species is tightly linked to its food plant devil's bit scabious. Recent research indicates that the ability of this species to recolonise new geographic areas is limited, with swathes of suitable habitat being required in close proximity. Marsh fritillary populations have been recorded in three of the SSSI component parts of the SAC (Caeau Cefn Cribwr, Bryn Bach and Pen y Castell).

Qualifying Features[33]

3.43 Annex I habitats that are a primary reason for selection of this site:

- *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)

3.44 Annex II species present as a qualifying feature, but not a primary reason for site selection:

- Marsh fritillary butterfly *Euphydryas aurinia*

Conservation Objectives[34]

3.45 The conservation status of a natural habitat is the sum of the influences acting on it and its typical species that may affect its long-term natural distribution, structure and functions as well as the long term survival of its typical species. The conservation status of a natural habitat will be taken as favourable when:

- Its natural range and areas it covers within that range are stable or increasing, and
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and

[32] Ibid.
[33] Available at: https://sac.jncc.gov.uk/site/UK0030113 [Accessed on the 26/04/2023]
[34] Available at: https://naturalresources.wales/media/671199/Cefn%20Cribwr%20Core%20SAC%20plan%20290108%20English.pdf [Accessed on the 26/04/2023]

- The conservation status of its typical species is favourable.

3.46 The conservation status of a species is the sum of the influences acting on the species that may affect the long-term distribution and abundance of its populations. The conservation status will be taken as 'favourable' when:

- Population dynamics data on the species indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Threats / Pressures to Site Integrity[35]

3.47 The following performance indicators for factors affecting the Cefn Cribwr Grasslands SAC are specified in CCW's Core Management Plan:

- Livestock grazing
- Hydrological regime
- Adjacent land use
- Extent and quality of the marshy grassland
- Presence of shelter belts
- Burning

Blackmill Woodlands SAC

Introduction

3.48 The Blackmill Woodlands SAC is a 70.05ha large site comprising broad-leaved deciduous woodland (92.5%) and heath / scrub (7.5%). It is an example of old sessile oak woods at the southernmost extent of the habitat's range in Wales. The ground flora within the woods is limited by the dry conditions of the site, encompassing sessile oak *Quercus petraea*, bilberry *Vaccinium myrtillus* and wavy hair-grass *Deschampsia flexuosa*. Moderate fern and bryophyte cover is also present. Notably, the gnarly appearance of many trees highlight the long history of woodland management within the site.

Qualifying Features[36]

3.49 Annex I habitats that are a primary reason for selection of this site:

- Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles

Conservation Objectives[37]

3.50 The conservation status of a natural habitat is the sum of the influences acting on it and its typical species that may affect its long-term natural distribution, structure and functions as well as the long term survival of its typical species. The conservation status of a natural habitat will be taken as favourable when:

- Its natural range and areas it covers within that range are stable or increasing, and

[35] Ibid.
[36] Available at: https://sac.jncc.gov.uk/site/UK0030090 [Accessed on the 26/04/2023]
[37] Available at: https://naturalresources.wales/media/670998/Blackmill%20Core%20SAC%20plan%20Jan%2008.pdf [Accessed on the 26/04/2023]

- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- The conservation status of its typical species is favourable.

3.51 The conservation status of a species is the sum of the influences acting on the species that may affect the long-term distribution and abundance of its populations. The conservation status will be taken as 'favourable' when:

- Population dynamics data on the species indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Threats / Pressures to Site Integrity[38]

3.52 The following performance indicators for factors affecting the Blackmill Woodlands SAC are specified in CCW's Core Management Plan:

- Livestock grazing
- Non-native species
- Air pollution

[38] Ibid.

4. Background Evidence to Impact Pathways

4.1 Where available, existing evidence and stakeholder knowledge will be drawn upon to inform the HRA of the Vale of Glamorgan RLDP. The following sections discuss existing baseline evidence and its relevance for development in the Vale of Glamorgan. Since leaving the EU (and thus the EUs network of internationally important Natura 2000 sites) the government has placed greater attention on the fact that the UKs international conservation sites are also part of the Bern Convention Emerald Network. All English and Welsh Emerald Network Sites (SPA and SAC sites), have Site Improvement Plans (SIPs) or Core Management Plans produced for them by Natural England / Natural Resources Wales. These documents identify existing threats and pressures to European sites and are drawn upon to inform this Scoping Report. At the same time, some SIPs are several years old and, therefore, more recent Supplementary Advice on Conservation Objectives is also consulted.

Recreational Pressure

4.2 There is concern over the cumulative impacts of recreation on key nature conservation sites in the UK, as most sites have a dual role of fulfilling Conservation Objectives while also providing recreational opportunity. Various research reports have provided compelling links between changes in housing and access levels[39], and impacts on European protected sites[4041.] While this is the case for any habitat, recreational impacts are particularly noteworthy for sites of high conservation importance. Due to different qualifying features and associated sensitivities, European sites differ in their susceptibility to different forms of recreation. Studies across a range of species have shown that the effects from recreation can be complex. HRAs of strategic planning documents tend to focus on the role of housing growth and new residents in altering usage levels in European sites. The Vale of Glamorgan RLDP will need to be robustly appraised due to its residential growth targets. An existing mitigation strategy is already adopted for parts of the Severn Estuary SAC / SPA / Ramsar in England and some Welsh authorities (Monmouthshire, Cardiff) are weighing up the implications of this for their own emerging RLDPs.

Bird Disturbance

4.3 Human recreation can affect wildlife (including birds, mammals, herptiles and invertebrates) in a multitude of ways. Most avian studies have focused on behavioural responses to disturbance, such as alertness responses, reduced foraging rates[42], minor flights and major flights to sub-optimal foraging habitats[4344]. One of the consequences of behavioural responses, and particularly major ones, is increased energy expenditure[4546]. The timing and type of a behavioural response is likely to be determined by the perceived level of threat as well as the energetic costs involved (e.g. to take major flight). At the extreme end of the spectrum, recreation can also result in mortality either directly or indirectly. For example, free-roaming dogs may predate on eggs and

[39] Weitowitz D.C., Panter C., Hoskin R. & Liley D. (2019). The effect of urban development on visitor numbers to nearby protected nature conservation sites. *Journal of Urban Ecology* **5**. https://doi.org/10.1093/jue/juz019
[40] Liley D, Clarke R.T., Mallord J.W., Bullock J.M. (2006a). The effect of urban development and human disturbance on the distribution and abundance of nightjars on the Thames Basin and Dorset Heaths. Natural England / Footprint Ecology.
[41] Liley D., Clarke R.T., Underhill-Day J., Tyldesley D.T. (2006b). Evidence to support the appropriate Assessment of development plans and projects in south-east Dorset. Footprint Ecology / Dorset County Council.
[42] Yasué M. (2005). The effects of human presence, flock size and prey density on shorebird foraging rates. *Journal of Ethology* **23**: 199-204.
[43] Burton N.H., Rehfisch M.M. & Clark N.A. (2002). Impacts of disturbance from construction work on the densities and feeding behavior of waterbirds using the intertidal mudflats of Cardiff Bay, UK. *Environmental Management* **30**: 865-871.
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[45] Stock M. & Hofeditz F. (1997). Compensatory limits: Energy budgets of brent geese, *Branta b bernicla*, the influence of human disturbance. *Journal Fuer Ornithologie* **138**: 387-411.
[46] Nolet B.A., Bevan R.M., Klaassen M., Langevoord O. & Van der Heijden Y. (2002). Habitat switching by Bewick's swans: Maximization of average long-term energy gain? *Journal of Animal Ecology* **71**: 979-993.

incubating adult birds[47]. Recreational impacts on ground-nesting birds are particularly severe, with many studies concluding that urban sites support lower densities of key species, such as stone curlew and nightjar[4849]. Furthermore, recreational access can also result in death through accidental trampling of nests, eggs and chicks[50]. Disturbance may also affect the survival rate of birds by making them more vulnerable to being caught by their natural predators[51].

4.4 However, disturbance can also result in much less obvious (and harder to measure) physiological effects and stress responses, which may in turn affect individual and population-level fitness. While studies on such 'indirect' health impacts are rare, there is empirical evidence that disturbance increase the heart rate[52] and stress hormone levels[5354] in birds. Therefore, available research indicates that disturbance responses are inherently complex and certainly encompass more than just flight behaviour.

4.5 Parameters that are likely to influence the magnitude of behavioural responses include group size[55], directional approach[56] and speed of movement[57]. Disturbance may also be associated with a seasonal element in that disturbance in winter is more impactful because natural food shortages make birds more vulnerable at this time of year. In contrast, this may be counterbalanced by fewer recreational users in the winter months and a lower overall sensitivity of birds outside the breeding season.

4.6 Disturbance is known to arise from a wide range of recreational activities, including walking / hiking, dog walking, horse riding, running, cycling / mountain biking and canoeing[58]. Newly emerging activities (e.g. drone-flying) have also been linked to disturbance issues[59]. However, the disturbance potential differs between different types of recreational activities. For example, in one study dog walking led to a significantly higher reduction in bird diversity and abundance compared to hiking[60]. It is also suggested that key disturbance parameters, such as areas of influence and flush distance, are significantly greater for dog walkers than hikers[61]. Furthermore, differences in on-site route lengths and usage patterns from visitor surveys imply that key spatial and temporal parameters (such as the area of a site potentially impacted and the frequency of disturbance) will also differ between recreational activities. This strongly suggests that the activity types undertaken in European sites ought to be taken into account in HRAs.

Trampling Damage, Soil Compaction and Erosion

4.7 Most terrestrial habitats (especially dune systems and old woodlands) can be affected by trampling and other mechanical damage. Mechanical disturbance dislodges and damages individual plants, leads to erosion and compacts soil. The following studies have assessed the

[47] Pienkowski M.J. (1984). Breeding biology and population dynamics of ringed plovers *Charadrius hiaticula* in Britain and Greenland: Nest predation as a possible factor limiting distribution and time of breeding. *Journal of the Zoological Society of London* **202**: 83-114.
[48] Clarke R.T., Liley D., Sharp J.M. & Green R.E. (2013). Building development and roads: Implications for the distribution of stone curlews across the Brecks. *PLOS ONE*. https://doi:10.1371/journal.pone.0072984.
[49] Liley D. & Clarke R.T. (2003). The impact of urban development and human disturbance on the numbers of nightjar *Caprimulgus europaeus* on heathlands in Dorset, England. Biological Conservation **114**: 219-230.
[50] Liley D. & Sutherland W.J. (2007). Predicting the population consequences of human disturbance for ringed plovers *Charadrius hiaticula*: A game theory approach. *Ibis* **149**: 82-94.
[51] Brambilla M., Rubolini D. & Guidali F. (2004). Rock climbing and raven *Corvus corax* occurrence depress breeding success of cliff-nesting peregrines *Falco peregrinus*. *Ardeola* **51**: 425-430.
[52] Ellenberg U., Mattern T. & Seddon P.J. (2013). Heart rate responses provide an objective evaluation of human disturbance stimuli in breeding birds. *Conservation Physiology* **1**: doi: 10.1093/conphys/cot013.
[53] Thiel D., Jenni-Eiermann S., Palme R. & Jenni L. (2011). Winter tourism increases stress hormone levels in the Capercaillie *Tetrao urogallus*. *Ibis* **153**: 122-133.
[54] Walker B.G., Dee Boersma P. & Wingfield J.C. (2006). Habituation of adult magellanic penguins to human visitation as expressed through behavior and corticosterone secretion. *Conservation Biology* **20**: 146-154.
[55] Beale C.M. & Monaghan P. (2005). Modeling the effects of limiting the number of visitors on failure rates of seabird nests. *Conservation Biology* **19**: 2015-2019.
[56] Smith-Castro J.R. & Rodewald A.D. (2010). Behavioral responses of nesting birds to human disturbance along recreational trails. *Journal of Field Ornithology* **81**: 130-138.
[57] Bellefleur D., Lee P. & Ronconi R.A. (2009). The impact of recreational boat traffic on marbled murrelets (*Brachyramphus marmoratus*). *Journal of Environmental Management* **90**: 531-538.
[58] Steven R., Pickering C. & Guy Castley J. (2011). A review of the impacts of nature based recreation on birds. *Journal of Environmental Management* **92**: 2287-2294.
[59] Mulero-Pázmány M., Jenni-Eiermann S.
[60] Banks P.B. & Bryant J.Y. (2007). Four-legged friend or foe? Dog walking displaces native birds from natural areas. *Biology Letters* **3**: 14pp.
[61] Miller S.G., Knight R.L. & Miller C.K. (2001). Wildlife responses to pedestrians and dogs. *Wildlife Society Bulletin* **29**: 124-132.

impact of mechanical damage exerted by various types of recreational activities in different habitats:

- Wilson & Seney)[62] examined the degree of track erosion caused by hikers, motorcyclists, horse riders and cyclists in 108 plots along tracks in the Gallatin National Forest, Montana. Although the results proved difficult to interpret, it was concluded that horse riders and hikers disturbed more sediment on wet tracks, and thereby causing more erosion, than motorcyclists and cyclists.

- Cole et al[6364] conducted experimental off-track trampling tests in 18 closed forest, dwarf scrub and meadow & grassland communities (each trampled between 0 – 500 times) over five mountain regions in the US. Vegetation cover was assessed two weeks and one year after trampling respectively, and an inverse relationship with trampling intensity was discovered (although this relationship was weaker after one year than two weeks indicating some recovery of vegetation). Differences in plant morphology (structure) was found to explain more variation in response than soil and topographic factors. Low-growing, mat-forming grasses regained their cover best after two weeks and were considered most resistant to trampling, while tall forbs (non-woody vascular plants other than grasses, sedges, rushes and ferns) were considered least resistant. The cover of hemicryptophytes (plants with buds at or near the soil surface) and geophytes (plants with buds below the soil surface) was heavily reduced after two weeks but had recovered well after one year. Chamaephytes (plants with buds above the soil surface) were least resilient to trampling.

- Cole[65] conducted a follow-up study (across four vegetation types) in which shoe type (trainers or walking boots) and trampling weight were varied. Although the immediate damage was greater with walking boots, there was no significant difference after one year. Heavier tramplers caused a greater reduction in vegetation height than lighter tramplers, but there was no differential impact on vegetation cover.

- Cole & Spildie[66] experimentally compared the effects of off-track trampling by hikers and horse riders (at two intensities – 25 and 150 passes) in two woodland vegetation types (one with an erect forb understorey and one with a low shrub understorey). While it was shown that higher trampling intensities cause more disturbance, there were marked differences between recreational activities and woodland types. Horse trampling caused the larger reduction in vegetation cover compared to hiking. The forb-dominated woodland suffered greater disturbance but recovered rapidly.

- Martin et al.[67] used unmanned aerial vehicle (UAV) imagery to document the impacts of a mountain bike, cyclocross bike and a hiker on soil compaction and vegetation composition at pass increments of 25, 75, 200 and 400. They showed that bikes with narrower tyres (cyclocross bikes) lead to higher soil compaction than bikes with wider tyres (mountain bikes), and both cycling types had higher impacts than hikers. However, at high pass intensities, the negative impacts were similar for all activities.

- Pascoe[68] found a significant correlation between trampling intensity and the distribution of field gentian *Gentianella campestris* and autumn lady's-tresses *Spiranthes spiralis* in New Forest grasslands (although it was concluded that the species are not under

[62] Wilson J.P. & Seney J.P. (1994). Erosional impact of hikers, horses, motorcycles and off-road bicycles on mountain trails in Montana. *Mountain Research and Development* **14**: 77-88.
[63] Cole D.N. (1995a). Experimental trampling of vegetation I: Relationship between trampling intensity and vegetation response. *Journal of Applied Ecology* **32**: 203-214.
[64] Cole D.N. (1995b). Experimental trampling of vegetation II: Predictors of resistance and resilience. *Journal of Applied Ecology* **32**: 215-224.
[65] Cole D.N. (1995c). Recreational trampling experiments: Effects of trampler weight and shoe type. Research Note INT-RN-425. U.S. Forest Service, Intermountain Research Station, Utah.
[66] Cole D.N. & Spildie D.R. (1998). Hiker, horse and llama trampling effects on native vegetation in Montana, USA. *Journal of Environmental Management* **53**: 61-71.
[67] Martin R.H., Butler D.R. & Klier J. (2018). The influence of tire size on bicycle impacts to soil and vegetation. *Journal of Outdoor Recreation and Tourism* **24**: 52-58.
[68] Pascoe C. Factors affecting the distribution of *Spiranthes spiralis* and *Gentianella campestris* on Wilverley Plain in the New Forest (BSc). University of Reading, Reading, UK.

existential threat from trampling if this does not creep into previously lightly or untrampled areas).

- Woodland trees (particularly ancient and veteran individuals) and their associated ground flora are sensitive to recreational trampling because of their large leaves and thin cell walls, adaptations to shady conditions. In the New Forest, trampling has been reported to result in the localised loss of characteristic ground flora[69], particularly surrounding well-trodden paths and 'honeypot' sites. Furthermore, trampling results in soil compaction surrounding root zones, which can reduce the ability of trees to extract water, lead to direct physical damage to roots and impacted associated soil fungi[70].

4.8 Sand dunes are dynamic systems that are shaped by factors such as the supply of sand and prevailing wind direction. 80% of dunes in the UK are currently subject to coastal erosion, diminishing the dune itself and creating bare ground. Natural England's Access and Nature Conservation Reconciliation guidance note states that light levels of trampling can increase plant diversity in dune systems, but medium to high levels of trampling promote bare ground, increase soil compaction, reduce plant diversity and change vegetation height. The type of dune habitat also influences its response to recreational pressure. For example, in fixed decalcified dunes the relationship between levels of access and impact is linear (i.e. it shows a proportionate relationship whereby the amount of damage increases gradually and predictably with the amount of footfall). In other dune types (e.g. embryonic shifting dunes), the relationship is curvilinear, suggesting that a small increase in trampling has a disproportionately strong effect, with a flattening of the impact curve under higher trampling regimes[71].

Nutrient Enrichment

4.9 A major concern for nutrient-poor terrestrial habitats (e.g. ancient woodland, heathland) is nutrient enrichment associated with dog fouling (addressed in various reviews, e.g.[72]). It is estimated that dogs will defecate within 10 minutes of starting a walk and therefore most nutrient enrichment arising from dog faeces will occur within 400m of a site entrance. In contrast, dogs will urinate at frequent intervals during a walk, resulting in a more widespread distribution of urine. For example, in Burnham Beeches National Nature Reserve it is estimated that 30,000 litres of urine and 60 tonnes of dog faeces are deposited annually[73]. While there is limited information on the chemical constituents of dog faeces, nitrogen is one of its main components[74].

4.10 A recent study has published further compelling evidence on the relative impact of N and phosphorus (P) deposition arising from dogs. Using 487 direct-count censuses from four peri-urban forests and nature reserves, the modelling data suggested that canine fertilisation rates amount to 11 kg N and 5 kg P per hectare per year respectively[75]. These amounts are significant when compared to atmospheric nitrogen deposition rates and the offsetting achievable through traditional habitat management techniques (e.g. cutting and removal of hay). The nitrogen deposition by dogs is particularly significant given the nitrogen Critical Load that is established for some European sites. For example, fixed coastal dunes with herbaceous vegetation have a CL range of 8-10 kg N/ha/yr (qualifying feature of the Kenfig SAC) on the Air Pollution Information System (APIS). This implies that the equivalent of the minimum CL of the site (11.1 kg N/ha/yr adjacent to Ogmore Road) is exceeded by N nitrogen deposition from dogs alone, before atmospheric sources are considered. Nutrient availability is the major determinant of plant community composition and the effect of dog defecation in sensitive habitats is comparable to a

[69] Tubbs C.R. (2001). The New Forest: History, Ecology and Conservation. Lyndhurst, Hampshire: New Forest Ninth Centenary Trust, New Forest Museum.
[70] Lake S., Liley D. & Saunders P. (2020). Recreation use of the New Forest SAC / SPA / Ramsar: Impacts of recreation and potential mitigation approaches. Unpublished report by Footprint Ecology. 96pp.
[71] Coombes E.G. (2007). The effects of climate change on coastal recreation and biodiversity. School of Environmental Sciences. University of East Anglia, Norwich.
[72] Taylor K., Anderson P., Taylor R.P., Longden K. & Fisher P. (2005). Dogs, access and nature conservation. English Nature Research Report, Peterborough.
[73] Barnard A. (2003). Getting the facts – Dog walking and visitor number surveys at Burnham Beeches and their implications for the management process. *Countryside Recreation* **11**:16-19.
[74] Taylor K., Anderson P., Liley D. & Underhill-Day J.C. (2006). Promoting positive access management to sites of nature conservation value: A guide to good practice. English Nature / Countryside Agency, Peterborough and Cheltenham.
[75] De Frenne P., Cougnon M., Janssens G.P.J. & Vangansbeke P. (2022). Nutrient fertilization by dogs in peri-urban ecosystems. *Ecological Solutions and Evidence* **3**: https://doi.org/10.1002/2688-8319.12128

high-level application of fertiliser, potentially resulting in a shift towards plant communities that are more typical of improved grasslands.

Summary

4.11 Several European sites relevant to the Vale of Glamorgan RLDP area are designated for habitats and species that are sensitive to recreational pressure. A growth in the local population will lead to an increased demand for access to outdoor areas and recreational greenspaces, especially European sites.

4.12 Overall, the following European sites within 15km of the Vale of Glamorgan authority boundary are sensitive to increased recreational footfall and, therefore, could be negatively impacted by residential development delivered under the RLDP:

- **Severn Estuary SAC / SPA / Ramsar** (located along the eastern boundary of the Vale of Glamorgan)
- **Dunraven Bay SAC** (situated in the western part of the authority)
- **Kenfig SAC** (located immediately north of the Vale of Glamorgan in the adjoining authority of Bridgend)
- **Cardiff Beech Woods SAC** (the closest component part of this SAC to the Vale of Glamorgan lies approx. 3.5km to the north-east in the adjoining authority of Cardiff)
- **Cefn Cribwr Grasslands SAC** (the closest component part of this SAC to the Vale of Glamorgan lies approx. 5.2km to the north in the adjoining authority of Bridgend)
- **Blackmill Woodlands SAC** (the closest component part of this SAC to the Vale of Glamorgan lies approx. 6km to the north in the adjoining authority of Bridgend)

Water Quality

4.13 The quality of the water that feeds European sites is an important determinant of the condition of the habitats and species they support. Poor water quality can have a range of environmental impacts:

- At high levels, toxic chemicals and metals can result in immediate death of aquatic life, and can have detrimental effects even at lower levels, including increased vulnerability to disease and changes in wildlife behaviour.
- Eutrophication, the enrichment of water with nutrients, increases plant growth and consequently results in oxygen depletion. Algal blooms, which commonly result from eutrophication, increase turbidity and decrease light penetration. The decomposition of organic wastes that often accompanies eutrophication deoxygenates water further, augmenting its oxygen-depleting effect. The main growth-limiting nutrient in freshwater habitats is phosphorus, whereas bioavailable nitrogen determines algal growth in coastal environments. However, nutrient co-limitation may be present in estuaries, which are jointly determined by the interplay of freshwater and sea water.
- Some pesticides, industrial chemicals and components of sewage effluent are suspected to interfere with the functioning of the endocrine system, possibly having negative effects on the reproduction and development of aquatic life.

4.14 The most notable issue in relation to the Vale of Glamorgan RLDP is the discharge of treated sewage effluent into the Severn Estuary SAC / SPA / Ramsar, which could increase nutrient concentrations (both phosphorus and nitrogen) in estuarine waters. In local watercourses feeding into the Severn Estuary phosphorus is the main limiting nutrient, whereas nitrogen will be the primary limiting factor in the estuary itself. Due to the proximity of the authority to the SAC / SPA / Ramsar, there is also a risk that surface runoff from impermeable surfaces containing non-toxic and toxic pollutants could directly reach the estuary. The R. Ely has been identified as a significant source of pollutants reaching the estuary. Phosphorus, largely from treated sewage discharge, and domestic / commercial misconnections are having a detrimental ecological impact in that

river. The 'bad' water quality in the R. Ely is significant in its role as a tributary to the Severn Estuary but is also of paramount importance in determining the habitat characteristics of what constitutes functionally linked habitat to the estuarine SAC, which is designated for anadromous fish.

4.15 The RLDP provides for development in the geographic area covered by Welsh Water, responsible for wastewater treatment in the Vale of Glamorgan. The potential ecological implications of RLDP development are outlined in Table 3.

Table 3: Wastewater Treatment Works (WwTWs) serving residential and employment development in the Vale of Glamorgan that are in potential hydrological continuity with the Severn Estuary SAC / SPA / Ramsar.

WwTW Catchment	Residential and employment development quantum allocated in the Vale of Glamorgan RLDP	Potential HRA implications
WwTWs operated by Welsh Water	A quantum of new residential dwellings and employment space over the RLDP period has not yet been specified	Discharge of treated sewage effluent into local watercourses that are in hydrological continuity with the estuary Discharge of treated sewage effluent directly into the Severn Estuary SAC / SPA / Ramsar

4.16 The increase in residential and employment development allocated in the RLDP will lead to an increase in the volume of treated sewage effluent discharged into local waterbodies, including the Severn Estuary. Overall, the following European sites within 15km of the Vale of Glamorgan authority boundary require further consideration in relation to negative water quality impacts (the sites in **bold** are taken forward to the following chapters):

- **Severn Estuary SAC / SPA / Ramsar** (located along the eastern boundary of the Vale of Glamorgan);
- Dunraven Bay SAC (situated in the western part of the authority);
- **Kenfig SAC** (located immediately north of the Vale of Glamorgan in the adjoining authority of Bridgend);
- Cardiff Beech Woods SAC (the closest component part of this SAC to the Vale of Glamorgan lies approx. 3.5km to the north-east in the adjoining authority of Cardiff);
- **Cefn Cribwr Grasslands SAC** (the closest component part of this SAC to the Vale of Glamorgan lies approx. 5.2km to the north in the adjoining authority of Bridgend); and
- Blackmill Woodlands SAC (the closest component part of this SAC to the Vale of Glamorgan lies approx. 6km to the north in the adjoining authority of Bridgend).

4.17 The Dunraven Bay SAC is designated for its population of shore dock, which is located on a damp coastal limestone cliff. While shore dock, like any plant species, is sensitive to a decline in water quality, it is not considered that this SAC has significant linkages to any surface and / or groundwater bodies. Therefore, it is extremely unlikely that treated sewage effluent from WwTWs would be impacting the shore dock population. The SAC is excluded from further consideration in relation to this impact pathway.

4.18 Like all plants, woodlands and their associated ground flora depend on the input of water of sufficient quality (primarily from rainfall) to maintain their ecological integrity. However, the Cardiff Beech Woods SAC and Blackmill Woodlands SAC do not depend on hydrological connectivity to any freshwater or groundwater bodies that could receive substantial input from WwTWs. Therefore, these SACs are excluded from further consideration in relation to this impact pathway.

Water Quantity, Level and Flow

4.19 The water level, its flow rates and the mixing conditions are important determinants of the condition of European sites and associated qualifying features. Hydrological processes are critical in influencing habitat characteristics in coastal waters, including current velocity, water depth, dissolved oxygen levels, salinity and water temperature. In turn these parameters determine the short- and long-term viability of plant and animal species, as well as overall ecosystem composition. Changes to the water flow rate within an estuary can be associated with a multitude of further impact pathways, including substratum loss, smothering and changes in wave exposure. Furthermore, freshwater input is essential in determining abiotic conditions in freshwater bodies and terrestrial habitats, where the latter comprise habitats or species with strong hydrological associations (e.g. *Molinia* meadows on calcareous, peaty or clayey-silt laden soils).

4.20 Increases in the quantity and rate of water delivery can result in summer flooding and prolonged / deeper winter flooding. This in turn results in the reduction of feeding and roosting sites for birds. For example, in areas where water is too deep, most waders will be unable to reach their food sources close to the ground.

4.21 Coastal environments rely on hydrological connections with freshwater bodies, such as rivers, streams and lakes. However, while the natural fluctuation of water levels within narrow limits is desirable, excess or too little water supply might cause water levels to be outside of the required range of qualifying birds and fish, or the invertebrate or plant assemblages they depend upon. There are two mechanisms through which urban development might negatively affect the water level in European sites:

- The supply of new housing with potable water will require increased abstraction of water from surface water and groundwater bodies. Depending on the level of water stress in the geographic region, this may impact the aquatic conditions in European sites sharing the same catchment.
- The proliferation of impermeable surfaces in urban areas increases the volume and speed of surface runoff, particularly during intense rainfall events. Traditional drainage systems often cannot cope with the volume of stormwater and sewer overflows are designed to discharge untreated water directly into watercourses. Often this pluvial flooding results in downstream inundation of watercourses and larger volumes of water reaching designated sites.

4.22 The potable water supply to residential and industrial developments is protected by legislation and delivered by individual water companies which cover different geographic areas of the UK. The management of available water resources is outlined in Water Resources Management Plans (WRMPs), which specify the Water Available for Use while also protecting environmental needs (such as water level requirements in European sites). Furthermore, WRMPs consider climate change impacts as a key parameter in determining water availability. Climate change will exacerbate many of the existing threats (e.g. low flows) that are faced by aquatic ecosystems. It is also likely that increased rainfall patterns will lead to an increased need for agricultural irrigation, which may lower flows in surface and groundwater bodies further. However, significant agricultural abstractions are subject to individual licenses from NRW and will be judged against any potential risk of over-abstraction, particularly with regard to the highest tier of environmental protection that is represented in European sites.

4.23 The Vale of Glamorgan adjoins the Severn Estuary SAC / SPA / Ramsar, which is sensitive to changes in the prevailing hydrological regime. The allocation of residential and employment development in the RLDP means that the following European sites within 15km of the Vale of Glamorgan authority boundary are at risk regarding changes in water quantity, level and flow (the sites in **bold** are taken forward into the following chapters):

- **Severn Estuary SAC / SPA / Ramsar** (located along the eastern boundary of the Vale of Glamorgan);
- Dunraven Bay SAC (situated in the western part of the authority);
- **Kenfig SAC** (located immediately north of the Vale of Glamorgan in the adjoining authority of Bridgend);

- Cardiff Beech Woods SAC (the closest component part of this SAC to the Vale of Glamorgan lies approx. 3.5km to the north-east in the adjoining authority of Cardiff);
- **Cefn Cribwr Grasslands SAC** (the closest component part of this SAC to the Vale of Glamorgan lies approx. 5.2km to the north in the adjoining authority of Bridgend); and
- Blackmill Woodlands SAC (the closest component part of this SAC to the Vale of Glamorgan lies approx. 6km to the north in the adjoining authority of Bridgend).

4.24 As discussed in relation to the impact pathway water quality, the Dunraven Bay SAC, Cardiff Beech Woods SAC and Blackmill Woodlands SAC are not reliant on hydrological continuity with freshwater or groundwater bodies. The qualifying habitats and species present within these sites have low dependencies on hydrological pathways, beyond a basic requirement for water (which will typically be delivered through precipitation events). Therefore, these SACs are excluded from further consideration in relation to this impact pathway.

Atmospheric Pollution (NH_3 and NOx Emission and N Deposition)

4.25 The main pollutants of concern for European sites are oxides of nitrogen (NOx), ammonia (NH_3) and sulphur dioxide (SO_2), and are summarised in Table 4. NH_3 can have a directly toxic effect upon vegetation, particularly at close distances to the source such as near road verges[76]. NOx can also be toxic at very high concentrations (far above the annual average Critical Level). However, NOx and NH_3 exert their main impacts on ecosystems via determining the total nitrogen (N) deposition to soils, potentially leading to deleterious knock-on effects. Increases in N deposition from the atmosphere are widely known to enhance soil fertility and lead to eutrophication. This often has adverse effects on community composition and the quality of semi-natural, nitrogen-limited terrestrial and aquatic habitats[77][78].

Table 4: Main sources and effects of air pollutants on habitats and species[79].

Pollutant	Source	Effects on habitats and species
Sulphur Dioxide (SO_2)	The main sources of SO_2 are electricity generation, and industrial and domestic fuel combustion. However, total SO_2 emissions in the UK have decreased substantially since the 1980's. Another origin of sulphur dioxide is the shipping industry and high atmospheric concentrations of SO_2 have been documented in busy ports. In future years shipping is likely to become one of the most important contributors to SO_2 emissions in the UK.	Wet and dry deposition of SO_2 acidifies soils and freshwater, and may alter the composition of plant and animal communities. The magnitude of effects depends on levels of deposition, the buffering capacity of soils and the sensitivity of impacted species. However, SO_2 background levels have fallen considerably since the 1970's and are now not regarded a threat to plant communities. For example, decreases in Sulphur dioxide concentrations have been linked to returning lichen species and improved tree health in London.
Acid deposition	Leads to acidification of soils and freshwater via atmospheric deposition of SO_2, NOx, ammonia and hydrochloric acid. Acid deposition from rain has declined by 85% in the last 20 years, which most of this contributed by lower sulphate levels.	Gaseous precursors (e.g. SO_2) can cause direct damage to sensitive vegetation, such as lichen, upon deposition. Can affect habitats and species through both wet (acid rain) and dry deposition. The effects of acidification include lowering of soil pH, leaf chlorosis, reduced decomposition rates, and compromised reproduction in birds / plants. Not all sites are equally susceptible to acidification. This varies depending on soil type, bed rock geology, weathering rate and buffering capacity. For example,

[76] http://www.apis.ac.uk/overview/pollutants/overview_NOx.htm.
[77] Wolseley P. A.; James P. W.; Theobald M. R.; Sutton M. A. (2006). Detecting changes in epiphytic lichen communities at sites affected by atmospheric ammonia from agricultural sources. *Lichenologist* **38**: 161-176.
[78] Dijk N. (2011). Dry deposition of ammonia gas drives species change faster than wet deposition of ammonium ions: Evidence from a long-term field manipulation. *Global Change Biology* **17**: 3589-3607.
[79] Information summarised from the Air Pollution Information System (http://www.apis.ac.uk/).

Pollutant	Source	Effects on habitats and species
		sites with an underlying geology of granite, gneiss and quartz rich rocks tend to be more susceptible.
Ammonia (NH_3)	Ammonia is a reactive, soluble alkaline gas that is released following decomposition and volatilisation of animal wastes. It is a naturally occurring trace gas, but ammonia concentrations are directly related to the distribution of livestock. It is also emitted from some vehicles. Ammonia reacts with acid pollutants such as the products of SO_2 and NO_X emissions to produce fine ammonium (NH_4+) - containing aerosol. Due to its significantly longer lifetime, NH_4+ may be transferred much longer distances (and can therefore be a significant trans-boundary issue). While ammonia deposition may be estimated from its atmospheric concentration, the deposition rates are strongly influenced by meteorology and ecosystem type.	The negative effect of NH_4+ may occur via direct toxicity, when uptake exceeds detoxification capacity and via N accumulation. Its main adverse effect is eutrophication, leading to species assemblages that are dominated by fast-growing and tall species. For example, a shift in dominance from heath species (lichens, mosses) to grasses is often seen. As emissions mostly occur at ground level in the rural environment and NH_3 is rapidly deposited, some of the most acute problems of NH_3 deposition are for small relict nature reserves located in intensive agricultural landscapes.
Nitrogen oxides (NO_x)	Nitrogen oxides are mostly produced in combustion processes. Half of NO_X emissions in the UK derive from motor vehicles, one quarter from power stations and the rest from other industrial and domestic combustion processes. In contrast to the steep decline in Sulphur dioxide emissions, nitrogen oxides are falling slowly due to control strategies being offset by increasing numbers of vehicles.	Direct toxicity effects of gaseous nitrates are likely to be important in areas close to the source (e.g. roadside verges). A critical level of NOx for all vegetation types has been set to 30 ug/m3. Deposition of nitrogen compounds (nitrates (NO_3), nitrogen dioxide (NO_2) and nitric acid (HNO_3)) contributes to the total nitrogen deposition and may lead to both soil and freshwater acidification. In addition, NO_x contributes to the eutrophication of soils and water, altering the species composition of plant communities at the expense of sensitive species.
Nitrogen deposition	The pollutants that contribute to the total nitrogen deposition derive mainly from oxidized (e.g. NO_X) or reduced (e.g. NH_3) nitrogen emissions (described separately above). While oxidized nitrogen mainly originates from major conurbations or highways, reduced nitrogen mostly derives from farming practices. The N pollutants together are a large contributor to acidification (see above).	All plants require nitrogen compounds to grow, but too much overall N is regarded as the major driver of biodiversity change globally. Species-rich plant communities with high proportions of slow-growing perennial species and bryophytes are most at risk from N eutrophication. This is because many semi-natural plants cannot assimilate the surplus N as well as many graminoid (grass) species. N deposition can also increase the risk of damage from abiotic factors, e.g. drought and frost.
Ozone (O_3)	A secondary pollutant generated by photochemical reactions involving NOx, volatile organic compounds (VOCs) and sunlight. These precursors are mainly released by the combustion of fossil fuels (as discussed above). Increasing anthropogenic emissions of ozone precursors in the UK have led to an increased number of days when ozone levels rise above 40ppb ('episodes' or 'smog'). Reducing ozone pollution is believed to require action at international level to reduce levels of the precursors that form ozone.	Concentrations of O_3 above 40 ppb can be toxic to both humans and wildlife, and can affect buildings. High O_3 concentrations are widely documented to cause damage to vegetation, including visible leaf damage, reduction in floral biomass, reduction in crop yield (e.g. cereal grains, tomato, potato), reduction in the number of flowers, decrease in forest production and altered species composition in semi-natural plant communities.

4.26 SO_2 emissions overwhelmingly derive from power stations and industrial processes that require the combustion of coal and oil, as well as shipping (particularly on a local scale)[80]. NH_3 emissions primarily originate from agricultural practices[81], with some chemical processes and some vehicles (notably petrol cars) also making notable contributions.

[80] http://www.apis.ac.uk/overview/pollutants/overview_SO2.htm.
[81] Pain B.F., Weerden T.J., Chambers B.J., Phillips V.R.; Jarvis, S.C. (1998). A new inventory for ammonia emissions from U.K. agriculture. *Atmospheric Environment* **32**: 309-313.

4.27 In contrast, NOx emissions are dominated by the output of vehicle exhausts (more than half of all emissions). A 'typical' housing development will contribute by far the largest portion to its overall NOx footprint (92%) through its associated road traffic. Other sources, although relevant, are of minor importance (8%) in comparison[82]. Therefore, the emerging RLDP, which will increase the population of the Vale of Glamorgan, can be reasonably expected to increase emissions of NOx and NH_3, and thus total N deposition through an increase in vehicular traffic.

4.28 The World Health Organisation has established thresholds for the different atmospheric pollutants, such as the critical NOx concentration (Critical Level) for the protection of vegetation of 30 μgm^{-3}, the NH_3 threshold for vascular plants of 3 μgm^{-3} and the threshold for SO_2 of 20 μgm^{-3}. In addition, ecological studies have determined Critical Loads (CLs)[83] for atmospheric nitrogen deposition (that is, NOx combined with NH_3).

4.29 According to the Department of Transport's Transport Analysis Guidance, beyond 200m, the contribution of vehicle emissions from the roadside to local pollution levels is insignificant (Figure 3 and see reference [84]). Therefore, this is the distance that is used in this HRA to identify major commuter routes along European Sites, which are likely to be significantly affected by development outlined in the RLDP.

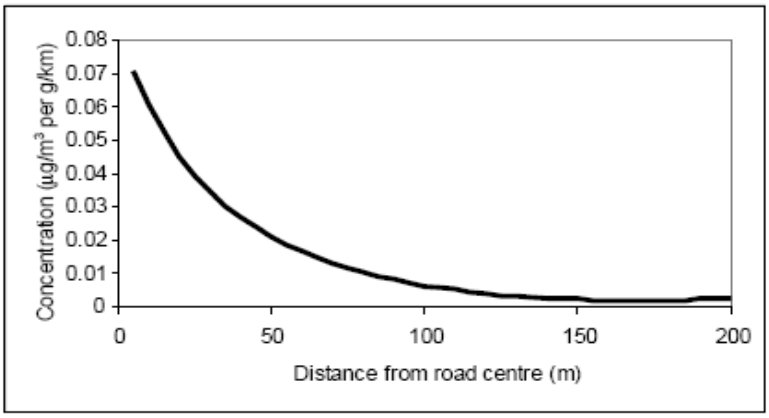


Figure 3: Traffic contribution to concentrations of pollutants at different distances from a road (Source: DfT[85]).

4.30 The UK Government intends to ban the sale of new petrol and diesel cars by 2030 in a push towards facilitating the energy transition and curbing carbon emissions. This will result in a significant shift in the vehicle fleet from traditional fossil-fuelled to electric cars. Improvements in air quality emissions will accompany this modal shift in transport, which is supported by the general improvement in air quality parameters that is evident in the modelled future scenarios of most Air Quality Impact Assessments, even when considering an increase in traffic volume. Notwithstanding this, even when taking account of the improving baseline, traffic growth has the potential to decelerate the vegetation recovery in European sites (that would otherwise occur under a scenario of no development), many of which have experienced nitrogen concentrations far beyond their CLs for decades. Therefore, despite an improving air quality across the UK, atmospheric pollution and associated negative impacts on sensitive habitats / species continue to be a key consideration in HRAs.

4.31 The following European sites within 15km of the Vale of Glamorgan authority boundary are sensitive to atmospheric pollution arising from urban growth, primarily due to a significant increase in the number of two-way vehicle trips through or within 200m of these sites (the sites in **bold** are taken forward into the following chapters):

- **Severn Estuary SAC / SPA / Ramsar** (located along the eastern boundary of the Vale of Glamorgan);

[82] Proportions calculated based upon data presented in Dore CJ et al. (2005). UK Emissions of Air Pollutants 1970 – 2003. UK National Atmospheric Emissions Inventory. http://www.airquality.co.uk/archive/index.php
[83] The Critical Load is the rate of deposition beyond which research indicates that adverse effects can reasonably be expected to occur
[84] Available at: http://www.dft.gov.uk/webtag/documents/expert/unit3.3.3.php#013 [Accessed on the 02/05/2023].
[85] http://www.dft.gov.uk/ha/standards/dmrb/vol11/section3/ha20707.pdf; accessed 13/07/2018

- Dunraven Bay SAC (situated in the western part of the authority);
- **Kenfig SAC** (located immediately north of the Vale of Glamorgan in the adjoining authority of Bridgend);
- **Cardiff Beech Woods SAC** (the closest component part of this SAC to the Vale of Glamorgan lies approx. 3.5km to the north-east in the adjoining authority of Cardiff);
- **Cefn Cribwr Grasslands SAC** (the closest component part of this SAC to the Vale of Glamorgan lies approx. 5.2km to the north in the adjoining authority of Bridgend);
- **Blackmill Woodlands SAC** (the closest component part of this SAC to the Vale of Glamorgan lies approx. 6km to the north in the adjoining authority of Bridgend)

4.32 The Dunraven Bay SAC is designated for shore dock, which has a nitrogen CL of 10-20 kg N/ha/yr. Generally, an exceedance of the minimum CL would pose the risk of a shift in community composition towards graminoids, which would result in the concurrent loss of shore dock cover. However, review of mapping on MAGIC shows that the SAC lies far from potential journey-to-work routes (the closest road of note being the B4265) and, therefore, an increase in commuter traffic will not affect the designated shore dock population. This site is not considered further in relation to this impact pathway.

Loss of Functionally Linked Habitat

4.33 While most European sites have been geographically defined to encompass the key features that are necessary for coherence of their structure and function, and the support of their qualifying features, this is not necessarily the case. A diverse array of qualifying species including birds, fish, mammals and invertebrates are not always confined to the boundary of designated sites.

4.34 For example, the highly mobile nature of both wader and waterfowl species implies that areas of habitat of crucial importance to the integrity of qualifying populations lie outside the physical limits of European sites. Despite not being part of the formal designation, these habitats are integral to the maintenance of the structure and function of the designated site, for example by encompassing important foraging grounds. Therefore, land use plans that may affect such functionally linked habitat require further assessment.

4.35 There is now an abundance of authoritative examples of HRA cases on plans affecting bird populations, where Natural England recognised the potential importance of functionally linked land[86]. For example, bird surveys in relation to a previous HRA established that approximately 25% of the golden plover population in the Somerset Levels and Moors SPA were affected while on functionally linked land, and this required the inclusion of mitigation measures in the relevant plan policy wording. Another important case study originates from the Mersey Estuary SPA / Ramsar, where adjacently located functionally linked land had a peak survey count of 108% of the 5 year mean peak population of golden plover. This finding led to considerable amendments in the planning proposal to ensure that the site integrity was not adversely affected.

4.36 Generally, the identification of an area as functionally linked habitat is not always a straightforward process. The importance of non-designated land parcels may not be apparent and thus might require the analysis of existing data sources (e.g. Bird Atlases or data from record centres) to be firmly established. In some instances, data may not be available at all, requiring further survey work.

4.37 Natural England has published guidance on SSSI Impact Risk Zones (IRZs)[87] associated with different types of development on various functional groups of birds (see Table 5). These IRZs provide a high-level screening tool for assessing the risk of planning applications to affect important habitats outside designated site boundaries. The guidance identifies that functionally linked habitats may extend up to the maximum foraging distances from roost locations, although it also notes that the proportion of designated foraging birds will decrease with distance from the

[86] Chapman C & Tyldesley D. 2016. Functional linkage: How areas that are functionally linked to European sites have been considered when they may be affected by plans and projects – A review of authoritative decisions. *Natural England Commissioned Reports* **207**. 73pp
[87] Knight M. (March 2019). Impact Risk Zones Guidance Summary – Sites of Special Scientific Interest Notified for Birds. Version 1.1. 8pp.

European site. Importantly, the IRZ guidance note does not define the required abundance threshold needed to meet the criterion of functional habitat linkage. However, Natural Resources Wales and Natural England generally advocate that usage of a land parcel of 1% of the qualifying SPA / Ramsar population is needed for that parcel to be defined as functionally linked habitat.

4.38 Overall, the available baseline information suggests that the following European sites within 15km of the Vale of Glamorgan authority boundary are sensitive to the loss of functionally linked habitat due to the presence of mobile waterfowl, waders and butterflies (the **sites in bold** are taken forward into the following chapters):

- **Severn Estuary SAC / SPA / Ramsar** (located along the eastern boundary of the Vale of Glamorgan); and
- **Cefn Cribwr Grasslands SAC** (the closest component part of this SAC to the Vale of Glamorgan lies approx. 5.2km to the north in the adjoining authority of Bridgend).

Table 5: Natural England Impact Risk Zones (IRZs) for different functional groups of birds.

Bird Assemblage	IRZs
Wintering birds (except wintering waders and grazing wildfowl; wigeon and geese)	Up to 500m
Dabbling ducks such as teal, mallard and gadwall	Home ranges could extend beyond site boundaries at coastal sites, but less likely to do so at inland water bodies.
Wintering waders (except golden plover and lapwing), brent goose & wigeon	Maximum foraging distance is 500m
Wintering lapwing and golden plover	Maximum foraging distance is 15-20km. Golden plover can forage up to 15km from a roost site within a protected site. Lapwing can also forage similar distances. Both species use lowland farmland in winter and it is difficult to distinguish between designated populations and those present within the wider environment. Developments affecting functionally linked land more than 10km from the site are unlikely to impact significantly on designated populations.
Wintering white-fronted goose, greylag goose, Bewick's swan, whooper swan, pink-footed goose & wintering bean goose	Maximum foraging distance is 10km although studies have shown that pink-footed geese will fly 20km from their roosting site to feed[88]. A bespoke functional land IRZ has replaced the individual Birds 6/7 IRZs for sites supporting the following goose and swan species: pink-footed geese, barnacle goose, Bewick's swan, white-fronted goose and whooper swan. The IRZ is based on GIS distribution records of feeding pink-footed geese from a study undertaken for Natural England by the Wildfowl & Wetlands Trust and the results of work undertaken by the British Trust for Ornithology to identify functionally connected habitat used by barnacle goose, Bewick's swan, white-fronted goose and whooper swan based on WeBS site and BirdTrack data and focuses on only the areas of land that we know are being used as functional habitat by designated populations

Noise and Visual Disturbance (During Construction)

4.39 Development can result in noise or visual disturbance to qualifying species in European sites, particularly during the construction phase of planning proposals. This may result in temporary behavioural changes in qualifying birds (e.g. interruption or cessation foraging, minor and major flight responses). Three of the most important factors determining the magnitude of disturbance from development schemes on ecological receptors appear to be individual species sensitivity, proximity of the disturbance source and timing / duration of the disturbance.

4.40 An increasing amount of research on noise and visual disturbance to waders and waterfowl from construction (and other activities) is now available. Both noise and visual stimuli may elicit disturbance responses, potentially affecting the fitness and survival of qualifying birds. Noise is

[88] https://monitoring.wwt.org.uk/wp-content/uploads/2018/12/Mapping-feeding-Pinkfeet-in-England-Final-report-vFinal.Jan15-2.pdf [accessed 14/04/2021]

a complex disturbance parameter requiring the consideration of multiple factors, including its non-linear scale, nonadditive effect and source-receptor distance. A high level of noise disturbance constitutes a sudden noise event of over 60dB or prolonged noise of over 72dB. Bird responses to high noise levels include cessation of feeding or major flight, both of which might affect the survival of birds, particularly if other stressors are also present (e.g. cold weather, food scarcity).

4.41 Generally, research has shown that above noise levels of 84dB waterfowl show a flight response, while at levels below 55dB there is no effect on their behaviour[89]. Therefore, these two thresholds are considered useful as defining two extremes. The same authors have advised that regular noise levels should remain below 70dB at bird receptors, which will habituate to noise levels below this level[90]. Generally, noise is attenuated by 6dB with every doubling of distance from the source. Impact piling, the noisiest construction activity of approx. 110dB at 0.67m from source, will thus reduce to 67-68dB by 100m away from the source. This implies that the loudest construction noise should have fallen to below disturbing levels by 100m, and certainly by 200m, away from the source even without mitigation. Note that this is a rule of thumb and does not obviate the need for application-level noise modelling. However, comparison with baseline noise levels will also be important in any assessment rather than purely using comparison with the 70dB metric.

4.42 An alternative approach to using absolute noise disturbance thresholds has emerged in recent years. Most birds habituate to disturbance stimuli due to repeated exposure to these in their natural habitats. As such, absolute noise thresholds are not necessarily the most meaningful way to assess the potential for disturbance. For example, noise levels above the 69dB established threshold may cause little to no disturbance in areas with existing loud soundscapes, depending on the pre-development baseline. Absolute noise thresholds may overestimate the threat that construction noise poses in some localities and place undue burdens on developers. As a more robust alternative, the absolute change in noise level between the baseline and construction activities may be used to assess this impact pathway. This requires the collection of baseline noise measurements at identified receptor locations and contrasting these with the outputs of noise models informed by construction parameters (e.g. location, type and duration of construction methods).

4.43 Visual stimuli are considered to have a higher disturbance potential than noise stimuli as, in most instances, visual stimuli will elicit a disturbance response at much greater distances than noise[91]. For example, a flight response is triggered in most species when they are approached to within 150m across a mudflat. Visual disturbance can be exacerbated by workers operating equipment outside machinery, undertaking sudden movements and using large machinery. Several species are particularly sensitive to visual disturbance[58], including curlew (taking flight at 275m), redshank (at 250m), shelduck (at 199m) and bar-tailed godwit (at 163m). Overall, specific regard should be given to assemblage composition when identifying threshold levels for both visual and noise disturbance.

4.44 The following European site within 15km of the Vale of Glamorgan authority boundary is sensitive to noise and visual disturbance arising in the construction period of development sites allocated in the RLDP (the site in **bold** is taken forward into the following chapters):

- **Severn Estuary SAC / SPA / Ramsar** (located along the eastern boundary of the Vale of Glamorgan)

Coastal Squeeze

4.45 Coastal squeeze is a well-established process that results in the net contraction and eventual disappearance of intertidal habitats, which may be designated features themselves and / or critical supporting habitats for SPA / Ramsar waders and waterfowl. Specifically, this impact pathway is facilitated by brownfield development immediately inland from the coastline, which results in intertidal habitat loss by preventing the landward migration of these habitats in response

[89] Cutts N & Allan J. (1999). Avifaunal Disturbance Assessment. Flood Defence Works: Saltend. Report to Environment Agency.
[90] Cutts N., Phelps A. & Burdon D. (2009). Construction and waterfowl: Defining Sensitivity, Response, Impacts and Guidance. Report to Humber INCA, Institute of Estuarine and Coastal Studies, University of Hull.
[91] Research undertaken by the Institute of Estuarine & Costal Studies, University of Hull. 2013. Available at: http://bailey.persona-pi.com/Public-Inquiries/M4%20-%20Revised/11.3.67.pdf [Accessed on the 24/04/2023].

to sea level rise. The published literature[92] provides the following definition of coastal squeeze: '*the loss of natural habitats or deterioration of their quality arising from anthropogenic structures or actions, preventing the landward transgression of those habitats that would otherwise naturally occur in response to sea level rise in conjunction with other coastal processes. Coastal squeeze affects habitat on the seaward side of existing structures.*' Several modelling studies on the implications of coastal squeeze have been undertaken. For example, provided that no additional space for accommodating sea level rise is provided (e.g. through nature-based coastal management approaches and Managed Realignment), a global loss of coastal wetland up to 30% is forecast to 2100[93]. A study comparing armoured and unarmoured coastal segments determined that defended coasts lacked dry upper beach zones and comprised narrower mid-beach zones. Furthermore, areas with frontline defences were also characterised by lower abundance, biomass and size of upper intertidal macroinvertebrates, and lower abundance and species richness of shorebirds[94].

4.46 Given the increasing density of urban development along coastlines, which interferes with natural adaptive processes of coastal habitats, coastal squeeze is becoming an increasingly important consideration in the HRA process. The approaches for coastal management are typically set at the strategic level in Shoreline Management Plans (SMPs) and Coastal Management Strategies (CMS). While being bound under the Habitats and Species Regulations 2017 (as amended), Local Planning Authorities are also legally required to protect important human receptors, including homes, businesses and critical infrastructure (e.g. roads and railway lines). These objectives may be conflicting, which means that in many instances protection of coastal assets cannot be achieved without adverse effects on site integrity. Clearly, the development allocated in the Vale of Glamorgan RLDP would constitute important human assets in close proximity to the coastline and its protection would be identified in the overarching SMP / CMS.

4.47 The following European site within 15km of the Vale of Glamorgan authority boundary is vulnerable to pressure from coastal squeeze, potentially arising from development allocated in the emerging RLDP (the site in **bold** is taken forward into the following chapters):

- **Severn Estuary SPA / Ramsar** (stretching along the south-east boundary of the authority).

[92] Environment Agency. (February 2021). Flood and Coastal Erosion Risk Management Research and Development Programme. Available at: https://www.gov.uk/flood-and-coastal-erosion-risk-management-research-reports/what-is-coastal-squeeze#:~:text=Coastal%20squeeze%20is%20now%20defined,conjunction%20with%20other%20coastal%20processes [Accessed on the 01/08/2022]
[93] Schuerch M, Spencer T, Temmerman S, Kirwan ML, Wolff C, Lincke D, McOwen CJ, Pickering MD, Reef R, Vafeidis AT, Hinkel J, Nicholls RJ & Brown S. (2018). Future response of global coastal wetlands to sea-level rise. *Nature* **561**: 231-234.
[94] Dugan JE, Hubbard DM, Rodil IF, Revell DL & Schroeter S. (2008). Ecological effects of coastal armoring on sandy beaches. *Marine Ecology* **29**: 160-170.

5. Screening for Likely Significant Effects (LSEs)

Recreational Pressure

Severn Estuary SAC / SPA / Ramsar

5.1 The Severn Estuary SAC / SPA / Ramsar adjoins the eastern shoreline of the Vale of Glamorgan in proximity to the conurbation of Penarth. The designated habitats in the SAC and non-breeding waterfowl and waders in the SPA / Ramsar are all sensitive to recreational pressure via different mechanisms. Data from visitor surveys across the UK's estuarine European sites, indicate that these exert strong recreational draws and are characterised by large core recreational catchments.

5.2 Through its allocation of 7,890 dwellings, 11 residential gypsy and traveller pitches, and its support for tourism-related development, the Vale of Glamorgan will result in an increase in the authority's population. In turn, this will result in heightened demand for outdoor greenspaces and could result in increased footfall within the Severn Estuary SAC / SPA / Ramsar. **Therefore, LSEs of the RLDP on the estuarine complex in relation to recreational pressure cannot be excluded and this impact pathway is screened in for AA.**

Cardiff Beech Woods SAC

5.3 The Cardiff Beech Woods, approx. 3.5km from the boundary of the Vale of Glamorgan, are designated for *Asperulo-Fagetum* beech forests and *Tilio-Acerion* forests of slopes, screes and ravines. Woodlands of European conservation interest are sensitive to recreational pressure via a range of pathways. Increased footfall over sensitive root zones results in soil compaction and changes to the ability of soil to hold water and nutrients. Trampling can also lead to direct damage to tree roots, which is particularly important where ancient or veteran trees are affected. Access by dog walkers also contributes to the process of nutrient enrichment, which can change the composition of the ground flora if sufficiently great.

5.4 Through its allocation of 7,890 dwellings, 11 residential gypsy and traveller pitches, and its support for tourism-related development, the Vale of Glamorgan RLDP will result in an increase in the local population. At 3.5km from the Vale of Glamorgan, the authority lies within a typical core recreational catchment of woodland sites. **Therefore, LSEs of the RLDP on the estuarine complex in relation to recreational pressure cannot be excluded and this impact pathway is screened in for AA.**

Dunraven Bay SAC

5.5 The Dunraven Bay SAC, designated for its population of shore dock, is situated in the western part of the Vale of Glamorgan to the south of Dunraven Bay. Shore dock and the associated species-rich neutral grassland community, like any botanical assemblage, is sensitive to negative impacts arising from recreational use. These include trampling damage to individual plants, track-side erosion, soil compaction and nutrient enrichment.

5.6 However, it is considered that the Dunraven Bay SAC is unlikely to be materially impacted by housing growth allocated in the RLDP. While it is situated along the Wales Coast Path, the RLDP is unlikely to allocate a significant quantum of homes within a routine travel distance from the SAC. The closest Key Site lies approx. 12.7km to the east of the SAC, even beyond a precautionary 10km core recreational catchment for coastal European sites. Furthermore, a review of mapping on outdooractive indicates that the SAC is characterised by extremely steep terrain. Any visitors to the site are likely to stick to existing footpaths for health and safety reasons. NRW's Core Management Plan does not identify recreational use as a factor potentially affecting the shore dock qualifying feature.

5.7 In conclusion, while the Dunraven Bay SAC lies within the Vale of Glamorgan, it is concluded that there will be no LSEs of the RLDP on the SAC regarding recreational pressure. This is due to a combination of the pattern of growth allocation within the RLDP as well as the prevailing topography within the SAC.

Kenfig SAC

5.8 The Kenfig SAC adjoins the Vale of Glamorgan and is situated in the authority of Bridgend. It is a very biodiverse site comprising coastal as well as freshwater habitats. It supports three types of dune habitats (i.e., fixed coastal dunes with herbaceous vegetation, dunes with *Salix repens* and humid dune slacks), all of which are sensitive to recreational footfall. The humid dune slacks within the SAC also support an important fen orchid population, which is also sensitive to negative recreational impacts such as direct trampling damage, soil compaction and nutrient enrichment. Natural Resources Wales' Core Management Plan specifies recreational and visitor pressure as a key factor affecting the feature. It states that '*vehicles or pressure from visitors including camping can cause damage or loss off to slack vegetation, compaction and erosion.*' Furthermore, illegal off-road motorcycling and 4x4 driving, and uncontrolled horse riding are listed as recreational activities of particular concern for the SAC.

5.9 Atlantic saltmarsh at the interface between the river and open coastline is another qualifying feature of the site. The Core Management Plan highlights trampling by horses as a key factor affecting the saltmarsh. The upper edge of the saltmarsh is regularly used by strings of 20+ horse riders from the trekking centre at Ogmore Castle Farm. Notwithstanding this, as evidenced through aerial photography, a loss of saltmarsh habitat occurred between 1991 and 2000. Natural Resources Wales are concerned that an increase in usage of the site by horse riders (and other users) has the potential to widen the single access route through the saltmarsh, encroaching further onto adjoining marsh habitat.

5.10 It is noted that wardening and surveillance of recreational activities (e.g., camping, illicit vehicle usage) and access is already in place. Furthermore, restrictions are in place to reduce vehicle usage in humid dune slacks and dunes with *Salix repens*. Horse riding among certain areas of dune slacks at Merthyr Mawr is also being undertaken, with access to sensitive habitats being discouraged by footpath deviations to less sensitive areas. Due to the increasing popularity of horse riding within the SAC, erosion impacts on the qualifying saltmarsh have intensified. However, the introduction of a Horse Riding Permit Scheme by the Countryside Council for Wales (CCW; predecessor of Natural Resources Wales) was successful in reducing the number of riding visits to the SAC. Furthermore, this scheme also confined riding to selected routes, reducing recreational pressure on more sensitive parts of the SAC. The Core Management Plan highlights that the access management measures are ongoing.

5.11 Given its location, most of the recreational footfall in the SAC will be contributed by residents from Porthcawl and the town of Bridgend. The nearest Key Site allocated in the Vale of Glamorgan RLDP (i.e., Land West of St Athan), lies approximately 15.6km to the south-east of the Kenfig SAC. This is even beyond the core catchments of the most popular coastal destinations, typically taken to be 15km. As such, residential growth allocated in the RLDP, as currently presented, is very unlikely to materially contribute to the recreational burden in the SAC. Therefore, there will be no LSEs of the RLDP on the Kenfig SAC regarding recreational pressure and this impact pathway is screened out from AA in relation to this European site. This impact pathway will be revisited in the Deposit Plan HRA, when the distribution of housing is finalised.

Cefn Cribwr Grasslands SAC

5.12 The Cefn Cribwr Grasslands SAC, designated for *Molinia* meadows and marsh fritillary butterfly, lies approx. 5.2km from the Vale of Glamorgan. *Molinia* meadows are potentially sensitive to recreational pressure via a range of pathways, including soil direct physical damage to plants, soil compaction, erosion and nutrient enrichment. Marsh fritillary could be impacted where recreational access reduces the availability of devil's-bit scabious, the preferred food plant of the butterfly at its larval stage.

5.13 Notwithstanding this, the SAC lies beyond a typical core recreational catchment for inland terrestrial sites of 5km. It is also noted that the Core Management Plan for the site does not identify recreational access as a factor impacting on the condition of the SAC. Overall, therefore,

there will be no LSEs of the RLDP on the Cefn Cribwr Grasslands SAC regarding recreational pressure and this impact pathway is screened out from AA in relation to this European site.

Blackmill Woodlands SAC

5.14 The Blackmill Woodlands SAC, designated for old sessile oak woods with *Ilex* and *Blechnum*, lies approx. 6km from the Vale of Glamorgan. As highlighted in relation to the Cardiff Beech Woods SAC above, qualifying woodlands are sensitive to recreational impacts through a variety of mechanisms. However, the Vale of Glamorgan lies beyond the typical 5km core recreational catchment for inland European sites and it should be noted that there are other woodland sites much closer to Vale of Glamorgan residents (e.g. the Cardiff Beech Woods SAC). Furthermore, the Core Management Plan does not identify recreational access as a factor affecting the condition of the oak woods. Overall, therefore, there will be no LSEs of the RLDP on the Blackmill Woodlands SAC regarding recreational pressure and this impact pathway is screened out from AA in relation to this European site.

Screening of RLDP Policies

5.15 All policies included in the Vale of Glamorgan RLDP Preferred Strategy were screened for LSEs in relation to recreational pressure. It was determined that the following policies require assessment in the AA:

- Policy SP1 (Growth Strategy) – identifies the broad strategic growth strategy for the Vale of Glamorgan for the period between 2021 and 2036, including the provision of 7,890 dwellings. The geographic locations for growth are also identified.
- Policy SP2 (Settlement Hierarchy) – specifies the settlement hierarchy for the Vale of Glamorgan, including the Key Settlement, Service Centre Settlements and Primary Settlements. This spatial element will contribute to the magnitude of several linking impact pathways.
- Policy SP3 (Housing Requirement) – reaffirms that a total of 7,890 dwellings will be delivered over the RLDP period, but that a portion of this growth will be delivered through an existing landbank of sites.
- Policy SP4 (Key Housing-Led Sites) – lists the Key Sites allocated for delivering the RLDP's housing requirements (in Barry, Dinas Powys, Rhoose and St Athan), totalling a quantum of between 2,450 and 2,750 dwellings.
- Policy SP4 KS1 (North-East Barry) – allocates up to 1,500 dwellings (900 of which will be delivered within the RLDP period), community facilities and green infrastructure in North-East Barry.
- Policy SP4 KS2 (Land to the North of Dinas Powys, Off Cardiff Road) – allocates up to 250 dwellings, recreation spaces and green infrastructure on land to the North of Dinas Powys.
- Policy SP4 KS3 (Readers Way, Rhoose) – allocates up to 450 dwellings, recreation spaces and green infrastructure at Readers Way, Rhoose.
- Policy SP4 KS4 (Church Farm, St Athan) – allocates between 250 and 550 dwellings, recreation spaces and green infrastructure at Church Farm, St Athan.
- Policy SP4 KS5 (Land to the West of St Athan) – allocates a residential-led development of up to 600 dwellings, recreation spaces and green infrastructure on Land to the West of St Athan).
- Policy SP9 (Gypsy and Travellers) – identifies that provision will be made for 11 residential pitches for gypsies and travellers as identified in the latest Gypsy and Traveller Accommodation Assessment (representing a contribution to the overall 'housing' growth).

- Policy SP14 (Sustainable Tourism) – provides general support for tourism in the Vale of Glamorgan, including new low-impact proposals, protection of existing attractions and enhancement of the visitor economy. This will effectively temporarily increase the local population and could lead to increased pressure on European sites.

Water Quality

Severn Estuary SAC / SPA / Ramsar

Treated Sewage Effluent

5.16 The Severn Estuary SAC / SPA / Ramsar stretches along the eastern coastline of the Vale of Glamorgan. It is designated for a range of aquatic habitats (e.g., estuaries, intertidal sand- and mudflats, and Atlantic saltmarsh) and fish (i.e., sea lamprey, river lamprey and twaite shad). All qualifying features of the SAC are sensitive to changes in water quality. For example, toxic pollutants, such as fuels, oils, paints and solvents may have direct toxicity on aquatic plants, invertebrates and fish. Furthermore, non-toxic contaminants (e.g., sediments and nutrients; specifically nitrogen in the marine environment) can trigger significant changes in habitat conditions with knock-on effects on invertebrate assemblages and fish. The joint Regulation 33 advice note published by Natural England and CCW, provides extensive evidence for the sensitivity of the SAC to water pollution. For example, regarding anadromous fish present in the estuary, negative changes in various water quality parameters (e.g., temperature, salinity, turbidity, pH and dissolved oxygen [DO]) '*may act as barriers to migration. For example, the timing, duration and consistency of their upstream migration are believed to be closely related to temperature changes as well as pheromone triggers from the juveniles during periods of high water flow.*' DO concentrations can be significantly reduced in stretches of the estuary receiving organic-rich sediments and / or high nitrogen loadings. Furthermore, Atlantic salt meadows are more vulnerable to nutrient enrichment than previously assumed. Elevated concentrations of nitrogen or phosphorus can increase the growth of specific seaweed species, smothering glasswort species and altering the overall community composition within the SAC.

5.17 Qualifying species in the Severn Estuary SPA / Ramsar are unlikely to be directly impacted by water pollution (except where large amounts of toxic pollutants are released, such as in oil spills). The main impact of water pollution is likely to occur via trophic cascades, whereby the composition of invertebrate or faunal communities is altered. Eutrophication can also lead to the excessive growth of algal mats on mudflats, reducing access of birds to their preferred invertebrate prey. Notwithstanding this, it should be noted that high nutrient levels may also be beneficial to some bird species by increasing the density and size of certain invertebrate species.

5.18 Sewage generated by the residential development allocated in the emerging RLDP will be treated in WwTWs, some of which may be in hydrological continuity with the Severn Estuary SAC / SPA / Ramsar. A review of all WwTWs owned and operated by Welsh Water, indicates that there is at least one WwTW (Cog Moors WwTW) in the eastern part of the Vale of Glamorgan. Furthermore, several Key Sites (i.e., Land North of Dinas Powys, Land at North East Barry) are coming forward in this part of the authority, indicating that the demand for headroom at the relevant WwTWs is expected to increase.

5.19 Overall, there is a clear mechanism linking the RLDP to the Severn Estuary SAC / SPA / Ramsar regarding potential water quality impacts. **Therefore, LSEs of the RLDP on the estuarine complex in relation to water pollution from treated sewage effluent cannot be excluded and this impact pathway is screened in for AA.**

Surface Runoff

5.20 Negative water quality impacts can also arise due to runoff from impermeable surfaces associated with developments, particularly following intense rainfall events. Rainwater and / or floodwater carried on impermeable surfaces has the potential to mobilise toxic and non-toxic contaminants. Any development allocated along the Penarth frontage may result in increased surface runoff into the Severn Estuary SAC / SPA / Ramsar, particularly where hydrological flows are inadequately managed.

5.21 The Preferred Strategy RLDP does not allocate any Key Sites at a distance to the Severn Estuary SAC / SPA / Ramsar within which material water quality impacts from surface runoff are likely to

arise. However, further site allocations will be coming forward under the Deposit RLDP and a significant proportion of residential growth will be delivered on windfall sites. At least some of these developments could lie within a few hundred metres of the SAC / SPA / Ramsar. **Therefore, LSEs of the RLDP on the estuarine complex in relation to water pollution from uncontrolled surface runoff cannot be excluded and this impact pathway is screened in for AA.**

Kenfig SAC

Treated Sewage Effluent

5.22 This coastal and estuarine site adjoins the north-western part of the Vale of Glamorgan and is situated in the authority of Bridgend. Some of the SAC's qualifying features critically depend on hydrological input, including the humid dune slacks and dunes with *Salix repens*, hard oligo-mesotrophic waters with benthic vegetation, Atlantic saltmarsh and fen orchid (the latter being primarily associated with humid dune slacks).

5.23 The Kenfig dune system and its associated characteristic plant assemblages are directly dependent on the prevailing hydrochemical regime. The main threat to the water quality within the SAC has been identified as elevated macronutrient concentrations, such as those resulting from the discharge of treated sewage effluent. Elevated nitrogen concentrations have been measured at Burrows Well (a karstic spring) on the Merthyr Mawr component of the site and the slacks have been identified as becoming increasingly eutrophic. The high permeability of the underlying limestone aquifer implies that relatively distant point-source and diffuse pollution sources have the potential to affect water quality in the SAC.

5.24 Kenfig Pool, an example of a hard oligo-mesotrophic freshwater system, is also sensitive to nutrient enrichment. Being a freshwater ecosystem, the main growth-limiting nutrient is considered to be phosphorus (currently at 20ug/l-1). Notwithstanding this, mean annual total nitrogen concentrations are likely to play an important supplementary role as N can be used at various stages in the growth cycle. The Core Management Plan for the SAC stipulates that there should be no evidence of sedimentation or excessive growth of cyanobacteria and green algae.

5.25 A high-level review indicates that there is at least one WwTW serving a population greater than 2,000 that discharges treated sewage effluent in the vicinity of the SAC (Pen-Y-Bont, Merthyr Mawr). Depending on the confirmed distribution of development in the Deposit RLDP and the WwTWs accommodating the sewage produced, there is the potential that the RLDP could affect the prevailing water quality in the Kenfig SAC. Furthermore, if any development allocations or windfall were to come forward in the north-west corner of the authority, impacts on water quality through surface runoff would require consideration (although this would only be an issue within 1km of the SAC boundary). **Overall, LSEs of the Vale of Glamorgan RLDP on the Kenfig SAC regarding water quality impacts from treated sewage effluent cannot be excluded. The site is screened in for AA in relation to this impact pathway.**

Surface Runoff

5.26 Negative water quality impacts can also arise due to runoff from impermeable surfaces associated with developments, particularly following intense rainfall events. Rainwater and / or floodwater carried on impermeable surfaces has the potential to mobilise toxic and non-toxic contaminants. Any development allocated within the north-west part of the Vale of Glamorgan may result in increased surface runoff into the R. Ogmore, particularly where hydrological flows are inadequately managed. While the river will generally carry any runoff towards the Bristol Channel, some lateral connectivity with the Kenfig SAC is likely to exist.

5.27 The Preferred Strategy RLDP does not allocate any Key Sites at a distance to the Kenfig SAC within which material water quality impacts from surface runoff are likely to arise. However, further site allocations will be coming forward under the Deposit RLDP and a significant proportion of residential growth will be delivered on windfall sites. At least some of these developments could lie within a few hundred metres of the SAC. **Therefore, LSEs of the RLDP on the Kenfig SAC in relation to water pollution from uncontrolled surface runoff cannot be excluded and this impact pathway is screened in for AA.**

Cefn Cribwr Grasslands SAC

5.28 The Cefn Cribwr Grasslands SAC is designated for *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils and marsh fritillary butterfly. *Molinia* meadows are a type of wet grassland with impeded drainage, which are critical in supporting its characteristic plant community composition. The Core Management Plan for the SAC indicates that the '*marshy grassland communities are strongly influenced by the quantity and base status of the groundwater. Reductions in the quality and quantity of the water in the springs and watercourses feeding the site may lead to a loss of marshy grassland or changes in species composition.*' It follows that marsh fritillary butterfly, which depend on devil's bit scabious (a characteristic component of the SAC flora) as their key food plant, will also be sensitive to water quality changes.

5.29 However, it is considered that there is no potential for the Vale of Glamorgan RLDP to impact on the water quality in the SAC. The SAC is situated approx. 5.2km to the north-west of the authority, whereas the relevant WwTWs serving emerging development would discharge to rivers that drain south towards the Bristol Channel. Therefore, there is no apparent hydrological link between growth in the Vale of Glamorgan and the SAC. Furthermore, at approx. 5.2km distance to the Vale of Glamorgan, there is no potential for water quality changes through surface runoff from impermeable surfaces. In conclusion, LSEs of the Vale of Glamorgan RLDP on the Cefn Cribwr Grasslands SAC regarding water quality can be excluded. The site is screened out from AA in relation to this impact pathway.

Screening of RLDP Policies

5.30 All policies included in the Vale of Glamorgan RLDP Preferred Strategy were screened for LSEs in relation to water quality. It was determined that the following policies require assessment in the AA:

- Policy SP1 (Growth Strategy) – identifies the broad strategic growth strategy for the Vale of Glamorgan for the period between 2021 and 2036, including the provision of 7,890 dwellings and 67.8ha of employment space. The geographic locations for growth are also identified.
- Policy SP2 (Settlement Hierarchy) – specifies the settlement hierarchy for the Vale of Glamorgan, including the Key Settlement, Service Centre Settlements and Primary Settlements. This spatial element will contribute to the magnitude of several linking impact pathways.
- Policy SP3 (Housing Requirement) – reaffirms that a total of 7,890 dwellings will be delivered over the RLDP period, but that a portion of this growth will be delivered through an existing landbank of sites.
- Policy SP4 (Key Housing-Led Sites) – lists the Key Sites allocated for delivering the RLDP's housing requirements (in Barry, Dinas Powys, Rhoose and St Athan), totalling a quantum of between 2,450 and 2,750 dwellings.
- Policy SP4 KS1 (North-East Barry) – allocates up to 1,500 dwellings (900 of which will be delivered within the RLDP period), community facilities and green infrastructure in North-East Barry.
- Policy SP4 KS2 (Land to the North of Dinas Powys, Off Cardiff Road) – allocates up to 250 dwellings, recreation spaces and green infrastructure on land to the North of Dinas Powys.
- Policy SP4 KS3 (Readers Way, Rhoose) – allocates up to 450 dwellings, recreation spaces and green infrastructure at Readers Way, Rhoose.
- Policy SP4 KS4 (Church Farm, St Athan) – allocates between 250 and 550 dwellings, recreation spaces and green infrastructure at Church Farm, St Athan.
- Policy SP4 KS5 (Land to the West of St Athan) – allocates a residential-led development of up to 600 dwellings, recreation spaces and green infrastructure on Land to the West of St Athan).

- Policy SP9 (Gypsy and Travellers) – identifies that provision will be made for 11 residential pitches for gypsies and travellers as identified in the latest Gypsy and Traveller Accommodation Assessment (representing a contribution to the overall 'housing' growth).
- Policy SP10 (Retail, Commercial and Service Centres) – specifies the hierarchy of retail, commercial and service centres within the Vale of Glamorgan, which will also be the preferred locations for the delivery of employment sites.
- Policy SP11 (Retail Floorspace) – delivers between 4,282 and 5,862m^2 of employment floorspace over the RLDP period, which will be directed towards the town and district centres.
- Policy SP13 (Employment Growth) – allocates 67.8ha of employment land and the delivery of 5,338 new jobs over the RLDP period, which will be the primary driver of employment-related impacts (e.g. atmospheric pollution).
- Policy SP14 (Sustainable Tourism) – provides general support for tourism in the Vale of Glamorgan, including new low-impact proposals, protection of existing attractions and enhancement of the visitor economy. This will effectively temporarily increase the local population and could lead to increased pressure on European sites.

Water Quantity, Level and Flow

Severn Estuary SAC / SPA / Ramsar

5.31 The Severn Estuary SAC / SPA / Ramsar is an estuarine complex that is designated for wide array of habitats, fish and non-breeding waterfowl / waders. All qualifying features depend on complex hydrodynamic conditions, shaped by the interplay between freshwater and saltwater sources. Mixing conditions in the estuary shape a range of critical habitat parameters for the characteristic plant and invertebrate assemblages in SAC habitats. In turn, overwintering birds depend on the availability of their preferred foraging resources for the adequate replenishment of energy reserves.

5.32 The allocation of 7,890 dwellings and 67.8ha of employment floorspace will increase the potable water requirements in the Vale of Glamorgan. Depending on how this water demand is proposed to be met, there may be hydrological implications across the Vale of Glamorgan, including, potentially, in European sites that depend on sufficient hydrological input. **Overall, the available evidence base indicates that LSEs of the Vale of Glamorgan RLDP on the Severn Estuary SAC / SPA / Ramsar regarding water quantity, level and flow cannot be excluded. This site is screened in for AA, where further evidence will be consulted.**

Kenfig SAC

5.33 The Kenfig SAC is a coastal site comprising habitats with critical dependencies on hydrological inputs, likely both from freshwater sources and influx of saline groundwater. Natural Resources Wales' Core Management Plan highlights the water level as a factor potentially affecting the dune systems within the SAC. It states that '*the exceptional wetness and diversity of the Kenfig dune system is directly dependent on the hydrological… regime. The slack vegetation is influenced and maintained by both a high water table and maintenance of suitable water quality.*' Furthermore, '*the nature of the underlying limestone aquifer means that off-site activities a considerable distance away can potentially have an impact on the SAC.*'

5.34 Similarly, the qualifying feature 'hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.' depends on the maintaining a natural hydrological regime. The SAC lake is fed by a combination of dune seepage, three ephemeral streams and a deep Carboniferous Limestone aquifer. Owing to its primary dependence on groundwater sources, it is difficult to estimate its precise catchment area. Overall, Natural Resources Wales recommends that abstraction in the catchment of the SAC should be regulated.

5.35 Through the allocation of 7,890 new dwellings and 67.8ha of employment space, the Vale of Glamorgan will increase the potable water demand within the authority. It is a legal requirement

of water companies (in this case Welsh Water) to supply new developments with potable water. If this additional water demand cannot be met within existing abstraction consents, this may require an increase in abstraction volumes from existing sources or the development of new sources. Where this affects water resources in hydrological connectivity with the Kenfig SAC, this may result in reduced water availability for designated SAC features.

5.36 **Overall, the available evidence base indicates that LSEs of the Vale of Glamorgan RLDP on the Kenfig SAC regarding water quantity, level and flow cannot be excluded. This site is screened in for AA, where further evidence will be consulted.**

Screening of RLDP Policies

5.37 All policies included in the Vale of Glamorgan RLDP Preferred Strategy were screened for LSEs in relation to water quantity, level and flow. It was determined that the following policies require assessment in the AA:

- Policy SP1 (Growth Strategy) – identifies the broad strategic growth strategy for the Vale of Glamorgan for the period between 2021 and 2036, including the provision of 7,890 dwellings and 67.8ha of employment space. The geographic locations for growth are also identified.
- Policy SP2 (Settlement Hierarchy) – specifies the settlement hierarchy for the Vale of Glamorgan, including the Key Settlement, Service Centre Settlements and Primary Settlements. This spatial element will contribute to the magnitude of several linking impact pathways.
- Policy SP3 (Housing Requirement) – reaffirms that a total of 7,890 dwellings will be delivered over the RLDP period, but that a portion of this growth will be delivered through an existing landbank of sites.
- Policy SP4 (Key Housing-Led Sites) – lists the Key Sites allocated for delivering the RLDP's housing requirements (in Barry, Dinas Powys, Rhoose and St Athan), totalling a quantum of between 2,450 and 2,750 dwellings.
- Policy SP4 KS1 (North-East Barry) – allocates up to 1,500 dwellings (900 of which will be delivered within the RLDP period), community facilities and green infrastructure in North-East Barry.
- Policy SP4 KS2 (Land to the North of Dinas Powys, Off Cardiff Road) – allocates up to 250 dwellings, recreation spaces and green infrastructure on land to the North of Dinas Powys.
- Policy SP4 KS3 (Readers Way, Rhoose) – allocates up to 450 dwellings, recreation spaces and green infrastructure at Readers Way, Rhoose.
- Policy SP4 KS4 (Church Farm, St Athan) – allocates between 250 and 550 dwellings, recreation spaces and green infrastructure at Church Farm, St Athan.
- Policy SP4 KS5 (Land to the West of St Athan) – allocates a residential-led development of up to 600 dwellings, recreation spaces and green infrastructure on Land to the West of St Athan).
- Policy SP9 (Gypsy and Travellers) – identifies that provision will be made for 11 residential pitches for gypsies and travellers as identified in the latest Gypsy and Traveller Accommodation Assessment (representing a contribution to the overall 'housing' growth).
- Policy SP10 (Retail, Commercial and Service Centres) – specifies the hierarchy of retail, commercial and service centres within the Vale of Glamorgan, which will also be the preferred locations for the delivery of employment sites.
- Policy SP11 (Retail Floorspace) – delivers between 4,282 and 5,862m^2 of employment floorspace over the RLDP period, which will be directed towards the town and district centres.

- Policy SP13 (Employment Growth) – allocates 67.8ha of employment land and the delivery of 5,338 new jobs over the RLDP period, which will be the primary driver of employment-related impacts (e.g. atmospheric pollution).
- Policy SP14 (Sustainable Tourism) – provides general support for tourism in the Vale of Glamorgan, including new low-impact proposals, protection of existing attractions and enhancement of the visitor economy. This will effectively temporarily increase the local population and could lead to increased pressure on European sites.

Atmospheric Pollution

Severn Estuary SAC / SPA / Ramsar

5.38 Emissions from road traffic have the potential to result in direct toxicity effects (by elevating NH_3 and NOx above their Critical Level), as well as increasing overall nitrogen deposition to sensitive SAC habitats. The main concern in relation to qualifying habitats in the Severn Estuary SAC would be a significant increase in nitrogen deposition, triggering eutrophication-like impacts and potentially resulting in shifts in plant community composition. APIS provides nitrogen Critical Loads (CLs) for pollution-sensitive habitats in the SAC. For example, saltmarsh has as CL of 10-20 kg N/ha/yr. It is noted that the lower end of this range should be applied to the more densely vegetated upper saltmarsh and areas of marsh subjected to direct runoff from adjacent catchments. Furthermore, embryonic shifting dunes also have a reported nitrogen CL of 10-20 kg N/ha/yr, with potential exceedance impacts including community composition changes, acceleration of successional stages, and loss of lichens and mosses.

5.39 Despite the sensitivity of the Severn Estuary SAC / SPA / Ramsar to atmospheric pollution impacts it is considered that the Vale of Glamorgan RLDP will make no material contribution to pollutant concentrations in these designated sites. A review of the existing road infrastructure indicates that there is no major commuter route within 200m of the site boundary in the Vale of Glamorgan. The closest 'A' road within the authority is the A4055, but this lies approx. 1.7km from the estuary at its closest. Even local residents that will commute to and from Cardiff City (by far the most important destination for and source of commuters from / to the Vale of Glamorgan according to Census 2001 data) are highly unlikely to travel on a major road within 200m of the designated site boundaries. The fastest route from Penarth to Cardiff would involve the aforementioned A4055 and A4232, neither of which run within 200m of the Severn Estuary SAC / SPA / Ramsar. Overall, LSEs of the Vale of Glamorgan RLDP on the Severn Estuary SAC / SPA / Ramsar regarding atmospheric pollution can be excluded. The site is screened out from AA in relation to this impact pathway.

Dunraven Bay SAC

5.40 The Dunraven Bay SAC, a coastal site situated in the western part of the Vale of Glamorgan, is designated for shore dock. According to APIS, this species has a nitrogen CL range of 5-15 kg N/ha/yr. An exceedance of the minimum CL is likely to lead to an increased cover of graminoids (grasses) and mesophilic forbs, as well as a decrease in oligotrophic species. Generally, most species of conservation importance are adapted to low nutrient concentrations, which places them at a competitive disadvantage under elevated nutrient regimes. There is no data of current nitrogen deposition rates within the SAC boundary on APIS.

5.41 However, the SAC is situated in a very rural part of the Vale of Glamorgan with no major commuter route within 200m. The closest road is the B4265 approx. 1.6km distance and the nearest A road lies considerably further away. Even if assuming that the Dunraven Bay SAC is a highly popular destination, it is unlikely that traffic volumes to Dunraven Bay car park resemble anything close to what would be regarded as material commuter traffic flows. In conclusion, LSEs of the Vale of Glamorgan RLDP on the Dunraven Bay SAC regarding atmospheric pollution can be excluded. The site is screened out from AA in relation to this impact pathway.

Kenfig SAC

5.42 Situated along the coastline to the north of Vale of Glamorgan, the Kenfig SAC is designated for a range of habitats that are sensitive to atmospheric pollution, particularly its host of dune

systems. The most sensitive dune habitat are the fixed coastal dunes with herbaceous vegetation with a nitrogen CL range of 5-10 kg N/ha/yr, which is followed by dunes with *Salix repens* (5-15 kg N/ha/yr). Sand dune habitats are one of the most natural remaining habitat types in the UK and generally infertile, making them highly sensitive to N deposition. For example, the reported impacts of nutrient enrichment in UK fixed dune grasslands is a decrease in species diversity and an increase in total biomass. Other habitat types within the Kenfig SAC (e.g. Atlantic saltmarsh; nitrogen CL of 10-20 kg N/ha/yr) are also sensitive to nitrogen deposition.

5.43 While there are no A roads within 200m of the Kenfig SAC, the B4524 runs within approx. 98m from the SAC boundary to the north of Ogmore-by-Sea. An assessment of Natural Resources Wales' Interactive Map Viewer indicates that the B4524 runs within approx. 126m of dune habitat and 178m of saltmarsh, both designated and sensitive SAC habitats. There are no significant employment destinations in this part of the authority, meaning that any impact from the B4524 would primarily arise due to commuters living in Ogmore-by-Sea and Southerndown, particularly those travelling to the adjoining authority of Bridgend. However, the Vale of Glamorgan RLDP does not allocate Key Sites in this part of the authority, which would have the potential to materially increase the traffic volume along the B4524. Overall, therefore, it is concluded that the Vale of Glamorgan RLDP will not result in LSEs on the Kenfig SAC regarding atmospheric pollution. This site is screened out from AA in relation to this impact pathway.

Cardiff Beech Woods SAC

5.44 The Cardiff Beech Woods SAC is located to the north-east of Vale of Glamorgan in the adjoining authority of Cardiff. This composite woodland site stretches along the A470, which adjoins Cardiff with Rhondda Cynon Taf to the north. The SAC is designated for two types of woodland, both of which are sensitive to nitrogen deposition. According to APIS, *Asperulo-Fagetum* beech forest (nitrogen CL of 10-15 kg N/ha/yr) is slightly more sensitive to atmospheric pollution than *Tilio-Acerion* forests of slopes, screes and ravines (15-20 kg N/ha/yr). Current deposition trends for the 1km grid squares covering the SAC indicate that the minimum CLs for both woodland types are currently being exceeded. For example, nitrogen deposition in the closest component part to the A470 is currently modelled as 22.1 kg N/ha/yr. Natural Resources Wales' Core Management Plan for the SAC highlights atmospheric pollution as a factor potentially affecting the qualifying woodland. '*The location of the woodland in industrialised South Wales, together with the presence of nearby quarrying and associated activities, means that there is the potential for localised atmospheric pollution.*'

5.45 In evaluating whether there is likely to be a reasonable link between the Vale of Glamorgan RLDP and atmospheric pollution in the SAC, it must be evaluated whether commuter traffic from and to the Vale of Glamorgan is likely to flow within 200m of the Cardiff Beech Woods SAC (i.e. on the aforementioned A470). A review of Census 2011 data indicates that Cardiff is the most likely destination for commuters from the Vale of Glamorgan (63.6% of all commuters travelling by car or van), as well as the most important source of commuters working within the Vale of Glamorgan (39.9%). However, most employment centres, which are concentrated in the south of Cardiff, would not require travelling past the SAC. Similarly, there is little housing in Cardiff within the vicinity of the Cardiff Beech Woods SAC, such that employment allocations in the emerging Vale of Glamorgan RLDP are unlikely to receive many commuters from this part of the authority.

5.46 Notwithstanding this, Rhondda Cynon Taf, the authority connected to Cardiff via the A470, is the second most important source (2,065 daily inflows, 19%) and third most important destination (1,457 daily outflows, 7.2%) of commuter traffic associated with the Vale of Glamorgan. The fastest routes between some of the major settlements in the Vale of Glamorgan and potential destinations in Rhondda Cynon Taf (e.g. Pontypridd, Porth and Abercynon) would all involve driving along the A470 within close proximity to the SAC. **Therefore, LSEs of the Vale of Glamorgan RLDP on the Cardiff Beech Woods SAC regarding atmospheric pollution cannot be excluded. The site is screened in for AA in relation to this impact pathway.**

Blackmill Woodlands SAC

5.47 The Blackmill Woodlands SAC is situated to the north of the Vale of Glamorgan in the adjoining authority of Bridgend. The site is designated for its old sessile oak woods with *Ilex* and *Blechnum*, which have a nitrogen CL range of 10-15 kg N/ha/yr as identified on APIS. An exceedance of the

minimum CL may lead to a range of impacts on trees, including preferential investment in upward rather than root growth (concomitant with increased risk of drought stress and uprooting), changes in mycorrhizal flora, increased litter production and winter desiccation.

5.48 At its closest, the Blackmill Woodlands SAC lies approx. 35m from the A4061 that runs all the way to the town of Bridgend. While there clearly is a potential for traffic-derived atmospheric pollution within the SAC, it is very unlikely that the Vale of Glamorgan will materially contribute to NH_3, NOx and total nitrogen deposition within the site. Much of the commuter traffic associated with the emerging RLDP (both outflows and inflows) will be to / from the town of Bridgend. Any travel to the town of Bridgend would not involve driving on the A4061 near the SAC, which lies considerably further north. It is also noted that the SAC is situated in a very rural area that encompasses little urban development. Overall, LSEs of the Vale of Glamorgan RLDP on the Blackmill Woodlands SAC regarding atmospheric pollution are excluded. The site is screened out from AA in relation to this impact pathway.

Cefn Cribwr Grasslands SAC

5.49 The Cefn Cribwr Grasslands SAC, situated in the adjoining authority of Bridgend, is designated for a habitat (*Molinia* meadows on calcareous, peaty or clayey-silt-laden soils) and marsh fritillary butterfly, both of which are sensitive to atmospheric pollution impacts. For example, APIS identifies a nitrogen CL range of 6-10 kg N/ha/yr for marsh fritillary butterfly. An exceedance of the minimum CL may result in indirect impacts on butterflies by altering the plant community composition within their wider habitat. For example, excessive nitrogen deposition may lead to an increase in graminoids, while decreasing species that are critical to the butterflies (e.g. devil's bit scabious). *Molinia* meadows have a nitrogen CL range of 15-25 kg N/ha/yr.

5.50 The Cefn Cribwr Grasslands SAC is a composite site with many SSSIs lying relatively far beyond 200m from any major roads. However, the Waun-fawr SSSI lies only approx. 130m from the M4, a major traffic artery permeating the authorities of Cardiff, Rhondda Cynon Taf, Bridgend and Neath Port Talbot an on east-west axis. While Census 2011 data indicate that there is an important exchange of commuter traffic with Bridgend (the authority within which the SAC lies), this is likely to focus predominantly on the town of Bridgend, with little urban development lying in the wider area around the Cefn Cribwr Grasslands SAC.

5.51 Census 2011 data also show that Neath Port Talbot is on the top ten destinations for / sources of commuter traffic associated with the Vale of Glamorgan. The M4 is by far the quickest and most direct route into Neath Port Talbot, a journey that would involve driving within 200m of the SAC. However, the volume of traffic exchange with this authority is very low. Of a total of 10,879 daily inflows, only 289 journeys (2.7%) are from Neath Port Talbot. Similarly, of the 20,136 out-commuters from the Vale of Glamorgan, only 232 journeys (1.2%) are undertaken to Neath Port Talbot. Therefore, any material traffic-associated air quality impacts on the Cefn Cribwr Grasslands SAC are unlikely due to the low volume of Annual Average Daily Traffic (AADT) involved. Overall, LSEs of the Vale of Glamorgan RLDP on the Cefn Cribwr Grasslands SAC regarding atmospheric pollution are excluded. The site is screened out from AA in relation to this impact pathway.

Screening of RLDP Policies

5.52 All policies included in the Vale of Glamorgan RLDP Preferred Strategy were screened for LSEs in relation to atmospheric pollution. It was determined that the following policies require assessment in the AA:

- Policy SP1 (Growth Strategy) – identifies the broad strategic growth strategy for the Vale of Glamorgan for the period between 2021 and 2036, including the provision of 7,890 dwellings and 67.8ha of employment space. The geographic locations for growth are also identified.
- Policy SP2 (Settlement Hierarchy) – specifies the settlement hierarchy for the Vale of Glamorgan, including the Key Settlement, Service Centre Settlements and Primary Settlements. This spatial element will contribute to the magnitude of several linking impact pathways.

- Policy SP3 (Housing Requirement) – reaffirms that a total of 7,890 dwellings will be delivered over the RLDP period, but that a portion of this growth will be delivered through an existing landbank of sites.
- Policy SP4 (Key Housing-Led Sites) – lists the Key Sites allocated for delivering the RLDP's housing requirements (in Barry, Dinas Powys, Rhoose and St Athan), totalling a quantum of between 2,450 and 2,750 dwellings.
- Policy SP4 KS1 (North-East Barry) – allocates up to 1,500 dwellings (900 of which will be delivered within the RLDP period), community facilities and green infrastructure in North-East Barry.
- Policy SP4 KS2 (Land to the North of Dinas Powys, Off Cardiff Road) – allocates up to 250 dwellings, recreation spaces and green infrastructure on land to the North of Dinas Powys.
- Policy SP4 KS3 (Readers Way, Rhoose) – allocates up to 450 dwellings, recreation spaces and green infrastructure at Readers Way, Rhoose.
- Policy SP4 KS4 (Church Farm, St Athan) – allocates between 250 and 550 dwellings, recreation spaces and green infrastructure at Church Farm, St Athan.
- Policy SP4 KS5 (Land to the West of St Athan) – allocates a residential-led development of up to 600 dwellings, recreation spaces and green infrastructure on Land to the West of St Athan).
- Policy SP9 (Gypsy and Travellers) – identifies that provision will be made for 11 residential pitches for gypsies and travellers as identified in the latest Gypsy and Traveller Accommodation Assessment (representing a contribution to the overall 'housing' growth).
- Policy SP10 (Retail, Commercial and Service Centres) – specifies the hierarchy of retail, commercial and service centres within the Vale of Glamorgan, which will also be the preferred locations for the delivery of employment sites.
- Policy SP11 (Retail Floorspace) – delivers between 4,282 and 5,862m^2 of employment floorspace over the RLDP period, which will be directed towards the town and district centres.
- Policy SP13 (Employment Growth) – allocates 67.8ha of employment land and the delivery of 5,338 new jobs over the RLDP period, which will be the primary driver of employment-related impacts (e.g. atmospheric pollution).
- Policy SP14 (Sustainable Tourism) – provides general support for tourism in the Vale of Glamorgan, including new low-impact proposals, protection of existing attractions and enhancement of the visitor economy. This will effectively temporarily increase the local population and could lead to increased pressure on European sites.

Loss of Functionally Linked Habitat

Severn Estuary SPA / Ramsar

5.53 The Severn Estuary SPA / Ramsar is designated for a range of overwintering waterfowl and waders, including Bewick's swan, European white-fronted goose, dunlin, redshank, shelduck and gadwall. The mobility of all these species implies that they may regularly utilise habitats beyond the designated site boundary for foraging, roosting, loafing and moulting. Maintaining adequate nutritional reserves is particularly important for wintering birds to enable their long journeys back to their summer grounds. The joint Regulation 33 advice note published by Natural England and CCW identifies the key supporting habitats for all qualifying species in the SPA. It is highlighted that Bewick's swan '*graze on a range of 'soft' meadow grasses such as Agrostis stolonifera and Alopecurus geniculatus found in wet meadows which are outwith the European Marine Site Boundary.*' Both Bewick's swan and European white-fronted goose are also known to utilise

agricultural land parcels, where they forage on overwinter stubble, spilt grain and left-over potatoes. The overall conclusion in Natural England's and CCW's advice note states that '*some species will also use areas of land and coastal waters outside the boundaries of both the European Marine Site, SPA and Ramsar Site. Relevant authorities need to have regard to such adjacent interests, as they might be affected by activities taking place… adjacent to the European Marine Site.*'

5.54 All bird species have core foraging ranges, i.e., the distance that most individuals will travel to feeding grounds. Goose species are known to have particularly large maximum foraging distances (up to 20km), although the travel distance of most individuals will be under 10km. The emerging Vale of Glamorgan RLDP allocates three Key Sites comprising arable land within 10km of the Severn Estuary SPA / Ramsar and, therefore, within the expected core foraging range of Bewick's swan and European white-fronted goose. The conversion of agricultural land to brownfield development has the potential to result in a net loss in off-site foraging opportunities for some of the qualifying SPA / Ramsar species. **Overall, LSEs of the Vale of Glamorgan RLDP on the Severn Estuary SPA / Ramsar regarding the potential loss of functionally linked habitat cannot be excluded. This site is taken forward to AA in relation to this impact pathway.**

Cefn Cribwr Grasslands SAC

5.55 The qualifying marsh fritillary in the Cefn Cribwr Grasslands SAC have limited mobility. Generally, this is thought to be a highly localised and sedentary species that forages on devil's bit scabious within the designated site boundary in the larval stage of its life cycle. However, in its adult life stage, both male and female butterflies may disperse from their former foraging patches. Research indicates that the average dispersal distances for male and female marsh fritillary are 1.5km and 510m respectively[95]. Therefore, any wet grassland with devil's bit scabious within 1.5km from the SAC boundary could constitute functionally linked habitat for the resident butterfly population.

5.56 However, the Cefn Cribwr Grasslands SAC lies approx. 5.2km to the north of the Vale of Glamorgan authority boundary, placing it relatively far beyond the dispersal distance for marsh fritillary butterfly. Therefore, any loss of wet grassland within the Vale of Glamorgan (if present), would not impact on the availability of supporting habitat to the SAC population. In conclusion, LSEs of the Vale of Glamorgan RLDP on the Cefn Cribwr Grasslands SAC regarding the potential loss of functionally linked habitat can be excluded. The site is screened out from AA in relation to this impact pathway.

Screening of RLDP Policies

5.57 All policies included in the Vale of Glamorgan RLDP Preferred Strategy were screened for LSEs in relation to the loss of functionally linked habitat. It was determined that the following policies require assessment in the AA:

- Policy SP1 (Growth Strategy) – identifies the broad strategic growth strategy for the Vale of Glamorgan for the period between 2021 and 2036, including the provision of 7,890 dwellings and 67.8ha of employment space. The geographic locations for growth are also identified.
- Policy SP2 (Settlement Hierarchy) – specifies the settlement hierarchy for the Vale of Glamorgan, including the Key Settlement, Service Centre Settlements and Primary Settlements. This spatial element will contribute to the magnitude of several linking impact pathways.
- Policy SP3 (Housing Requirement) – reaffirms that a total of 7,890 dwellings will be delivered over the RLDP period, but that a portion of this growth will be delivered through an existing landbank of sites.

[95] Wahlberg, N., Klemtti, T., Selonen, V. & Hanski, I. (2002). Metapopulation structure and movements in five species of checkerspot butterflies. *Oecologia* **130**: 2074-2091.

- Policy SP4 (Key Housing-Led Sites) – lists the Key Sites allocated for delivering the RLDP's housing requirements (in Barry, Dinas Powys, Rhoose and St Athan), totalling a quantum of between 2,450 and 2,750 dwellings.
- Policy SP4 KS1 (North-East Barry) – allocates up to 1,500 dwellings (900 of which will be delivered within the RLDP period), community facilities and green infrastructure in North-East Barry.
- Policy SP4 KS2 (Land to the North of Dinas Powys, Off Cardiff Road) – allocates up to 250 dwellings, recreation spaces and green infrastructure on land to the North of Dinas Powys.
- Policy SP4 KS3 (Readers Way, Rhoose) – allocates up to 450 dwellings, recreation spaces and green infrastructure at Readers Way, Rhoose.
- Policy SP4 KS4 (Church Farm, St Athan) – allocates between 250 and 550 dwellings, recreation spaces and green infrastructure at Church Farm, St Athan.
- Policy SP4 KS5 (Land to the West of St Athan) – allocates a residential-led development of up to 600 dwellings, recreation spaces and green infrastructure on Land to the West of St Athan).
- Policy SP9 (Gypsy and Travellers) – identifies that provision will be made for 11 residential pitches for gypsies and travellers as identified in the latest Gypsy and Traveller Accommodation Assessment (representing a contribution to the overall 'housing' growth).
- Policy SP10 (Retail, Commercial and Service Centres) – specifies the hierarchy of retail, commercial and service centres within the Vale of Glamorgan, which will also be the preferred locations for the delivery of employment sites.
- Policy SP11 (Retail Floorspace) – delivers between 4,282 and 5,862m^2 of employment floorspace over the RLDP period, which will be directed towards the town and district centres.
- Policy SP13 (Employment Growth) – allocates 67.8ha of employment land and the delivery of 5,338 new jobs over the RLDP period, which will be the primary driver of employment-related impacts (e.g. atmospheric pollution).
- Policy SP14 (Sustainable Tourism) – provides general support for tourism in the Vale of Glamorgan, including new low-impact proposals, protection of existing attractions and enhancement of the visitor economy. This will effectively temporarily increase the local population and could lead to increased pressure on European sites.

Visual and Noise Disturbance (During Construction)

Severn Estuary SPA / Ramsar

5.58 The Severn Estuary SPA / Ramsar is designated for several individual waterfowl and wader species (as well as an overarching waterbird assemblage), which will utilise habitat within and functionally linked habitat outside the designated site boundary. While all bird species are sensitive to visual and noise disturbance, the magnitude of behavioural and physiological responses will show considerable intra- and inter-specific variation. The SPA / Ramsar designation includes a thin strip of intertidal habitats adjoining the eastern Vale of Glamorgan coastline.

5.59 The Preferred Strategy RLDP allocates several Key Sites, which will deliver a large portion of the development over the Plan period. The closest Key Site (Land North of Dinas Powys) lies at approx. 2.5km distance from the SPA / Ramsar. According to research published by the Institute for Estuarine and Coastal Studies, this is far beyond a precautionary screening distance of 300m within which material disturbance impacts are likely to arise. However, it is noted that the Deposit RLDP will allocate further residential sites and small- / large-scale windfall development is expected to come forward. Any of these additional developments could come forward much

closer to the Severn Estuary SPA / Ramsar, within the visual and noise impact buffer zone for qualifying birds.

5.60 **Therefore, as a precautionary measure, LSEs of the Vale of Glamorgan RLDP on the Severn Estuary SPA / Ramsar regarding visual and noise disturbance from construction works cannot be excluded. The site is screened in for AA in relation to this impact pathway.**

Screening of RLDP Policies

5.61 All policies included in the Vale of Glamorgan RLDP Preferred Strategy were screened for LSEs in relation to visual and noise disturbance during construction. It was determined that the following policies require assessment in the AA:

- Policy SP1 (Growth Strategy) – identifies the broad strategic growth strategy for the Vale of Glamorgan for the period between 2021 and 2036, including the provision of 7,890 dwellings and 67.8ha of employment space. The geographic locations for growth are also identified.
- Policy SP2 (Settlement Hierarchy) – specifies the settlement hierarchy for the Vale of Glamorgan, including the Key Settlement, Service Centre Settlements and Primary Settlements. This spatial element will contribute to the magnitude of several linking impact pathways.
- Policy SP3 (Housing Requirement) – reaffirms that a total of 7,890 dwellings will be delivered over the RLDP period, but that a portion of this growth will be delivered through an existing landbank of sites.
- Policy SP4 (Key Housing-Led Sites) – lists the Key Sites allocated for delivering the RLDP's housing requirements (in Barry, Dinas Powys, Rhoose and St Athan), totalling a quantum of between 2,450 and 2,750 dwellings.
- Policy SP4 KS1 (North-East Barry) – allocates up to 1,500 dwellings (900 of which will be delivered within the RLDP period), community facilities and green infrastructure in North-East Barry.
- Policy SP4 KS2 (Land to the North of Dinas Powys, Off Cardiff Road) – allocates up to 250 dwellings, recreation spaces and green infrastructure on land to the North of Dinas Powys.
- Policy SP4 KS3 (Readers Way, Rhoose) – allocates up to 450 dwellings, recreation spaces and green infrastructure at Readers Way, Rhoose.
- Policy SP4 KS4 (Church Farm, St Athan) – allocates between 250 and 550 dwellings, recreation spaces and green infrastructure at Church Farm, St Athan.
- Policy SP4 KS5 (Land to the West of St Athan) – allocates a residential-led development of up to 600 dwellings, recreation spaces and green infrastructure on Land to the West of St Athan).
- Policy SP9 (Gypsy and Travellers) – identifies that provision will be made for 11 residential pitches for gypsies and travellers as identified in the latest Gypsy and Traveller Accommodation Assessment (representing a contribution to the overall 'housing' growth).
- Policy SP10 (Retail, Commercial and Service Centres) – specifies the hierarchy of retail, commercial and service centres within the Vale of Glamorgan, which will also be the preferred locations for the delivery of employment sites.
- Policy SP11 (Retail Floorspace) – delivers between 4,282 and 5,862m^2 of employment floorspace over the RLDP period, which will be directed towards the town and district centres.

- Policy SP13 (Employment Growth) – allocates 67.8ha of employment land and the delivery of 5,338 new jobs over the RLDP period, which will be the primary driver of employment-related impacts (e.g. atmospheric pollution).
- Policy SP14 (Sustainable Tourism) – provides general support for tourism in the Vale of Glamorgan, including new low-impact proposals, protection of existing attractions and enhancement of the visitor economy. This will effectively temporarily increase the local population and could lead to increased pressure on European sites.

Coastal Squeeze

Severn Estuary SAC / SPA / Ramsar

5.62 The Severn Estuary is an extensive coastal site that comprises extensive areas of qualifying intertidal habitats, including Atlantic saltmarsh as well as sand- and mudflats. Any negative impacts from coastal squeeze would reduce the area of qualifying habitat, equating to adverse effects on site integrity. The aforementioned intertidal habitats also represent key foraging and roosting sites for SPA / Ramsar waterfowl and waders, such that any loss from coastal squeeze would indirectly impact these birds by diminishing food and resting resources. Any development allocations on greenfield sites immediately inland from the estuary would reduce the capacity of qualifying habitats to naturally retreat landward in line with sea level rise.

5.63 While it is noted that none of the Key Sites adjoin the estuarine coastline, further site allocations will be proposed under the Deposit RLDP. Furthermore, a relatively large quantum of housing will be delivered on windfall development, which may come forward in close proximity to the coastline. **Therefore, as a precautionary measure, LSEs of the Vale of Glamorgan RLDP on the Severn Estuary SAC / SPA / Ramsar regarding coastal squeeze cannot be excluded. The site is screened in for AA in relation to this impact pathway.**

Screening of RLDP Policies

5.64 All policies included in the Vale of Glamorgan RLDP Preferred Strategy were screened for LSEs in relation to coastal squeeze. It was determined that the following policies require assessment in the AA:

- Policy SP1 (Growth Strategy) – identifies the broad strategic growth strategy for the Vale of Glamorgan for the period between 2021 and 2036, including the provision of 7,890 dwellings and 67.8ha of employment space. The geographic locations for growth are also identified.
- Policy SP2 (Settlement Hierarchy) – specifies the settlement hierarchy for the Vale of Glamorgan, including the Key Settlement, Service Centre Settlements and Primary Settlements. This spatial element will contribute to the magnitude of several linking impact pathways.
- Policy SP3 (Housing Requirement) – reaffirms that a total of 7,890 dwellings will be delivered over the RLDP period, but that a portion of this growth will be delivered through an existing landbank of sites.
- Policy SP4 (Key Housing-Led Sites) – lists the Key Sites allocated for delivering the RLDP's housing requirements (in Barry, Dinas Powys, Rhoose and St Athan), totalling a quantum of between 2,450 and 2,750 dwellings.
- Policy SP4 KS1 (North-East Barry) – allocates up to 1,500 dwellings (900 of which will be delivered within the RLDP period), community facilities and green infrastructure in North-East Barry.
- Policy SP4 KS2 (Land to the North of Dinas Powys, Off Cardiff Road) – allocates up to 250 dwellings, recreation spaces and green infrastructure on land to the North of Dinas Powys.

- Policy SP4 KS3 (Readers Way, Rhoose) – allocates up to 450 dwellings, recreation spaces and green infrastructure at Readers Way, Rhoose.
- Policy SP4 KS4 (Church Farm, St Athan) – allocates between 250 and 550 dwellings, recreation spaces and green infrastructure at Church Farm, St Athan.
- Policy SP4 KS5 (Land to the West of St Athan) – allocates a residential-led development of up to 600 dwellings, recreation spaces and green infrastructure on Land to the West of St Athan).
- Policy SP9 (Gypsy and Travellers) – identifies that provision will be made for 11 residential pitches for gypsies and travellers as identified in the latest Gypsy and Traveller Accommodation Assessment (representing a contribution to the overall 'housing' growth).
- Policy SP10 (Retail, Commercial and Service Centres) – specifies the hierarchy of retail, commercial and service centres within the Vale of Glamorgan, which will also be the preferred locations for the delivery of employment sites.
- Policy SP11 (Retail Floorspace) – delivers between 4,282 and 5,862m^2 of employment floorspace over the RLDP period, which will be directed towards the town and district centres.
- Policy SP13 (Employment Growth) – allocates 67.8ha of employment land and the delivery of 5,338 new jobs over the RLDP period, which will be the primary driver of employment-related impacts (e.g. atmospheric pollution).
- Policy SP14 (Sustainable Tourism) – provides general support for tourism in the Vale of Glamorgan, including new low-impact proposals, protection of existing attractions and enhancement of the visitor economy. This will effectively temporarily increase the local population and could lead to increased pressure on European sites.

6. Appropriate Assessment

Recreational Pressure

Severn Estuary SAC / SPA / Ramsar

6.1 The Severn Estuary site complex is situated along the eastern edge of the Vale of Glamorgan. As highlighted in the LSEs screening section, public access / disturbance represents the most important pressure and threat to the integrity of the site. Specifically, Natural England's SIP states that '*Public access and recreation… may have an impact on bird species sensitive to disturbance, causing displacement from feeding, roosting and moulting areas, and if severe could affect long term survival and population numbers and distributions within the Estuary. There are a wide range of recreational activities within the site (walking, dog walking, horse riding, biking, beach activities, angling, wildfowling, other shooting (eg clay pigeon)) that may cause damage to habitats where pressure is high.*' Due to the existing recreational pressure within the estuary, one of the actions identified in the SIP is to undertake a programme of targeted education and awareness raising amongst key recreational user groups, such as angling groups, holiday makers, local residents and schools.

6.2 Site total waterfowl and wader species counts are a critical performance indicator for European sites. The accompanying Conservation Objectives typically aim at maintaining or, where significant declines have occurred, increasing population numbers. According to British Trust for Ornithology (BTO) Wetland Bird Survey (WeBS) data, the Severn Estuary supported a total bird abundance of 86,831 in 2017/18, which dropped to its lowest point in 2020/21 (64,877). However, by 2021/22 the population had recovered to 82,619, almost reaching the total population recorded in 2017/18. Overall, abundance data for the Severn Estuary SPA / Ramsar appear to indicate that the qualifying bird populations are relatively stable.

6.3 The main determinants of the extent of recreational usage of European sites include proximity to urban centres and existing infrastructure enabling access. The town of Penarth, specified as a Service Centre Settlement in the Vale of Glamorgan RLDP, borders onto the stretch of the Severn Estuary SAC / SPA / Ramsar within the Vale of Glamorgan, placing its residents within easy walking distance of the estuary. Barry, identified as the Key Settlement within the RLDP, lies approx. 4.1km to the west of the SAC / SPA / Ramsar. While this would be too far for most residents to walk, this is well within routine driving distance for regular site visitors. The RLDP directs a significant portion of the 7,890 dwellings to be delivered over the Plan period to the settlements of Barry and Penarth, indicating that the demand for recreational greenspaces in this part of the authority will increase. As one of the main destinations on offer, it is reasonable to assume that recreational footfall within or adjoining the Severn Estuary SAC / SPA / Ramsar will also increase compared to the pre-RLDP baseline. Notwithstanding this, it must also be noted that various alternative destinations with similar characteristics exist along the southern coastline of the Vale of Glamorgan, including Sully Bay, and the areas around Barry Harbour and Porthkerry (none of which are designated under the Severn Estuary SAC / SPA / Ramsar). Therefore, the additional recreational burden due to the RLDP will not solely focus on the designated sites and will be somewhat absorbed by non-designated stretches of the coastline.

6.4 The section of the Severn Estuary SAC / SPA / Ramsar most likely to be visited by future Vale of Glamorgan residents due to proximity from home, extends between Penarth Head and Lavernock Point. The Wales Coast Path, a long-distance hiking trail, adjoins Mean High Water between Penarth Pier all the way south to Lavernock, bringing recreational users in close proximity to intertidal habitats that are themselves qualifying features of the SAC and / or supporting qualifying SPA / Ramsar bird species. As highlighted above, residential development within Penarth is within easy walking distance of the estuary, indicating that much of the current recreational burden in this part f the SAC / SPA / Ramsar is likely to stem from nearby housing. However, there also one large formal car park serving this part of the coastline (Cliff Parade Car Park with 100+ parking spaces). Given that parking charges do not currently apply to this car park, it is considered that it may represent a focal point for car-based visitors from further afield (e.g. Barry).

6.5 Generally, the maximum area of intertidal habitat (i.e. the habitat between Mean High Water and Mean Low Water) potentially subjected to disturbance is relatively limited, particularly when considered in relation to its entirety in the Severn Estuary SAC / SPA / Ramsar. The maximum width of the intertidal zone along the Vale of Glamorgan is approx. 467m at Ranny Point, which is considerably narrower than in other parts of the authority. It follows that the importance of the Vale of Glamorgan coastline in terms of the abundance and diversity of qualifying birds supported is also likely to be more limited. Additionally, at least a portion of the intertidal zone is dominated by rocky cliffs and outcrops, which are of comparatively limited suitability for SPA / Ramsar bird species. Most qualifying species predominantly graze in saltmarsh (Bewick's swan, white-fronted goose) or probe for invertebrates in mudflats, but these habitats are of limited prevalence along the Vale of Glamorgan. Notwithstanding this, Natural England's and Countryside Council for Wales' joint conservation advice package for Severn Estuary European Marine Site (EMS) also specifies hard substrate habitats (rocky shores) as being important for wintering dunlin, redshank and shelduck for foraging of suitable invertebrates, such as *Carcinus*, *Crangon*, Corophium, Hydrobia, *Macoma*, *Mytilus*, *Hediste* and *Talitrus* spp.

Existing Evidence Base

6.6 The Severn Estuary SPA / Ramsar is a destination with a unique funnel shape, meaning that it runs diagonally along several authorities, including Forest of Dean, Stroud, Monmouthshire, Cardiff and the Vale of Glamorgan. Due to its scenery and geography, the site has a unique recreational draw on residents in adjoining authorities and these are likely to visit stretches of the estuary with suitable access points that are closest to home. No visitor data on access points within the Vale of Glamorgan is available. However, the following visitor survey data are available for other stretches of the Severn Estuary SAC / SPA / Ramsar:

- Comprehensive overview of recreational boating in the estuary published by the Association of Severn Estuary Relevant Authorities (ASERA)[96];
- Visitor survey undertaken by Footprint Ecology in 2017 to inform a recreation strategy within Forest of Dean District[97];
- Visitor survey undertaken by EPR in 2016 for the part of the Severn Estuary SAC / SPA / Ramsar within Stroud District[98]; and
- Visitor survey undertaken by AECOM on the Welsh side of the estuary for the emerging RLDPs for Monmouthshire and Torfaen.

6.7 These surveys were conducted to establish a baseline of recreational usage within the estuary and to assess the potential implications of residential growth in the respective authorities in terms of recreational footfall. Due to the unique shape of the estuary, the data from these surveys are not directly relevant to the Vale of Glamorgan, illustrated by the fact that the surveys did not capture visitors from this authority. Nevertheless, the data show that Vale of Glamorgan lies within the core recreational catchment of the site and some of the patterns of visitor use highlighted in these surveys are likely to be similar for the authority (for example, the high proportion dog walkers constitute of the total recreational burden). Furthermore, the visitor management interventions discussed in Footprint Ecology's Lydney recreation strategy provide useful context and potential guidance on mitigation measures that may be needed in relation to the Vale of Glamorgan RLDP. The main results from each of the recreational surveys are discussed in the following.

Recreational Boating

6.8 Water-based activities are likely to be particularly disturbing to overwintering birds because they may bring visitors closer to sensitive areas, such as roosts or foraging sites. Furthermore, the

[96] Association of Severn Estuary Relevant Authorities. (November 2016). Recreational boating in the Severn Estuary. 85pp. Available at: https://asera.org.uk/wp-content/uploads/sites/3/2016/11/ASERA-Water-Based-Recreation-Report-Nov-2016-Low-Res2.pdf [Accessed on the 04/04/2023]
[97] Liley D., Panter C. & Hoskin R. 2017. Lydney Severn Estuary Visitor Survey and Recreation Strategy. Unpublished report by Footprint Ecology for the Forest of Dean District Council. 55pp. Available at: https://www.footprint-ecology.co.uk/reports/Liley%20et%20al%202017%20Lydney%20Severn%20Estuary%20Visitor%20Survey%20and%20Recreation%20Strategy.pdf [Accessed on the 31/10/2019]
[98] Southgate J. & Colebourn K. 2016. Severn Estuary (Stroud District) Visitor Survey Report. Report for Stroud District Council. Ecological Planning & Research, Winchester. 68pp. Available at: https://www.stroud.gov.uk/media/2902/severnestuaryvs_report_15581c_final_060616.pdf [Accessed on the 31/10/2019]

infrastructure associated with boating activities (e.g. moorings) is known to be particularly damaging to benthic habitats, leading to erosion, abrasion and sediment displacement. The Association of Severn Estuary Relevant Authorities (ASERA) published a study of water-based recreation in the Severn Estuary EMS (which covers parts of the SAC / SPA / Ramsar designation) in 2016. It summarises the key environmental impacts of boating, gives an overview of current boat usage trends and suggests steps for managing water-based activities. Recreational boats access the estuary using 35 launching and access points (31 slipways and four sets of locks). Of these, three slipways are located along the Penarth frontage. Most slipways are owned or managed by recreational boat clubs and usage of slipways is restricted to club members or requires prior permission for non-members. For example, the Vale of Glamorgan Council slipways are used by Penarth Yacht Club, Penarth Water Ski Club and the Royal National Lifeboat Institution (RNLI). Very popular slipways, such as those in Penarth and Cardiff Bay, are managed through a permit system. These broad management systems are important because they inherently limit the peak number of boat users in the estuary at any one time.

6.9 The Royal Yachting Association (RYA) identified indicative boating routes of varying levels of intensity in their UK Coastal Atlas of recreational Boating (2008). Cardiff Bay and the estuarine section along the Vale of Glamorgan are focal areas for routes with heavy recreational use, with at least six or more boats at all times on summer days. For the Penarth seafront, an estimated peak of up to 30 boats / day is provided for summer weekend, dropping to 8-9 boats / day in winter. Overall, the indicative level of boating activity in summer is ‘medium’, compared to a ‘low’ level of boating in winter.

6.10 Most disturbance impacts from water-based recreation are likely to be temporary (with birds ceasing foraging and moving to less disturbed areas, but then returning to their roosting / feeding ground). However, if prolonged disturbance impacts are present, this may result in permanent displacement, often to sub-optimal foraging habitats. Disturbance is likely to be biggest where the rapid movement of boats across the water is accompanied by loud noises (e.g. powerboating, water-skiing, jet-skiing). Generally, recreational boating is unlikely to be of concern in the open water, but mainly in proximity to intertidal zones and important bird roost sites. Another main risk is associated with disturbance from intermittent activity at landing and launching points in close proximity to intertidal habitats.

6.11 However, the RYA report concluded that recreational boating is unlikely to be causing significant disturbance to foraging and roosting overwintering birds for the following reasons:

- Seasonal separation between peak recreational boating use and peak bird use between October and March;
- Tidal separation between boat usage (frequently restricted to high tides when intertidal mudflats are unavailable for birds) and foraging periods;
- Infrequent and temporary exposure to boating on the winter days where this does occur (likely to a maximum of four hours in any 24 hour period); and
- High levels of disturbance from other sources (e.g. dog walkers, people wildfowling, port and shipping operations) particularly near busy cities will mean that many birds will have already habituated to human activity.

6.12 To minimise the negative impacts of water-based activities, education management tools are in place in the estuary. The RYA’s approach relies on the principle that education tends to be more effective than regulation. It runs courses that provide resources and practical advice on a range of environmental topics, which are completed by more than 155,000 people per year. The Green Blue, a partnership between the RYA and British Marine, has published a series of guides and factsheets with the aim to raise awareness among the industry and recreationists. For example, Fact Sheet 1 discusses the effects of boating and watersports on wildlife, with the aim to generate awareness of overwintering birds. As part of the UK Marine SACs Project, good practice guidelines were developed for recreation activities in European Marine Sites to promote good behaviour towards the environment.

Lydney Visitor Survey

6.13 The Lydney visitor survey covered the four main access points to the part of the Severn Estuary SAC / SPA / Ramsar closest to Lydney, where new development was proposed at the time of

survey. Across all survey points, the total number of people entering the wider area around the estuary was 153, equating to an hourly rate of 9.6 people entering. Of 83 interviewees, 36 visitors (43%) undertook dog walking and 14 visitors (17%) were walking. Boating was undertaken by only 5 interviewees (6%). The visit duration was similarly short for all activities (mostly between 30 minutes and 1 hour, except for boating). Dog walking was the recreational activity that involved the highest proportion of frequent visits, with a total of 41% of dog walkers visiting daily or most days (180+ visits per year). Most interviewees tended to live very close to the SAC. For example, dog walkers travelled a median distance of 2.3km to their access points (typically on foot), highlighting the potential significance of new nearby residential development. Overall, the Lydney survey highlighted that the Severn Estuary SAC / SPA / Ramsar is subject to regular disturbance from particular user groups, especially dog walkers.

6.14 Footprint Ecology places the visitor data in the context of bird distribution data within the wider area around Lydney, derived from Mills & Smart (2017)[99]. Importantly, Mills & Smart also considered habitat that might be functionally linked and integral to supporting the SPA / Ramsar qualifying species (e.g. New Grounds, Lydney to Aylburton). It was shown that the area covered by the visitor survey is important for roosting / feeding curlew, shelduck and lapwing in winter, and whimbrel on passage (April-May, July-September). It was also determined that for mallard, lapwing, curlew and whimbrel the counts in some habitats outside the designated site boundary exceed 1% of the designated relevant SPA / Ramsar populations, meaning that the area fulfils the criterium for functionally linked habitat. A proportion of the visitor use in Lydney occurs in areas that are important to SPA / Ramsar species, and Footprint Ecology therefore provided the following recommendations for the management and mitigation of recreational pressure in Lydney:

- Provision of steps to access the foreshore in less sensitive areas and additional planting to increase attractiveness and variety;
- Updating interpretation boards along the estuary to communicate the importance of nature conservation to visitors;
- Discouraging people from venturing south-west across New Grounds (high sensitivity area) by highlighting the ‘long’ and ‘difficult’ walk involved, as well as displaying dog-on-lead signage;
- Creating a marked circular cycle lane from Lydney along Harbour Road to link up with Naas Lane;
- Improving footpath surfacing, planting and connectivity to create an attractive, circular walk that draws users away from New Grounds; and
- Establishing a clearly signposted and well surfaced default route that attracts dog walking visitors.

Stroud Visitor Survey

6.15 EPR’s Stroud visitor survey focussed on the upper section of the Severn Estuary SAC / SPA / Ramsar near the confluence of the River Severn with the estuary. It surveyed nine access points, which were either parking locations or Public Right of Ways (PRoWs) providing direct access on to the estuary. Overall, 461 people accessed the area over two survey days, equating to 30.7 people per hour. Furthermore, 185 dogs were recorded over the two days of surveying, equating to an average of 12.3 dogs entering per hour. 51.6% of interviewed groups had at least one dog with them, which is slightly less than observed at other marine sites such as the Solent (53%) and North Kent (65%). The average (mean) distance travelled by visitors to access points was 14.5km. Visitors arriving on foot, i.e. local residents, had travelled an average of 5.4km. Using postcode data, the study also identified a visitor catchment for the Severn Estuary SAC / SPA / Ramsar, using the 75th percentile of distance to home to delineate the catchment buffer. Interestingly, and in contrast to Lydney, where visitors travelled very short distances to the site, the estuary in Stroud has indicative recreational catchments of 17.7km (all visitors) and 7.7km (Stroud residents only) respectively. The main reason for this disproportionately large catchment

[99] Mills B. & Smart M. 2017. Lydney New Grounds. Desk Based Review of Bird Assemblages in Relation to the Severn Estuary Special Protection Area. Unpublished report for Forest of Dean District Council.

is most likely the low housing density in this part of Stroud District, which is significantly lower than in other coastal areas of the UK (e.g. the Solent).

Monmouthshire and Torfaen Visitor Survey

6.16 The Monmouthshire RLDP makes provision for 8,366 new dwellings over the plan period, including the Strategic Growth Areas of Chepstow and Severnside. A considerable portion of this housing will be delivered within a 1km walking distance from the estuary, such that the RLDP is likely to increase the recreational burden within the SPA / Ramsar / SAC considerably. Based on a recommendation by AECOM, Monmouthshire Council and Torfaen Council (the latter authority also progressing their RLDP inclusive of housing growth) jointly commissioned a visitor survey at four access points (covering both parking and foot access locations) to provide the first in-combination visitor data along the Welsh part of the estuary.

6.17 The visitor count at surveyed locations ranged between 127 (Caldicot Coast Path, foot access only) and 613 (RSPB Newport Wetlands, large car park available at the RSPB site) people over two survey days, indicating that the estuary in Wales is busier than some of its counterpart sections in England (e.g. in Lydney the busiest location only had 98 visitors entering over 16 hours). As applies to most other European sites, dog walking was by far the most common activity (48.9% of interviewees), followed by walking (29.8%) and family outings (5.9%). The proportion of dog walkers was considerably higher at Caldicot Coast Path and Black Rock Car Park, most likely because both survey points lie in easy walking distance to nearby residential development. Generally, the responses indicate that interviewees are very loyal to the SAC / SPA / Ramsar, with 51.6% visiting either daily, most days (180+ visits per annum) or 1 to 3 times per week (40 to 180 visits per annum). No strong seasonal pattern in recreational trends were discernible, indicating that the disturbance potential does not diminish in the overwintering period of SPA / Ramsar birds. Home postcodes were collected to establish a core recreational catchment for the Welsh part of the Severn Estuary SAC / SPA / Ramsar. Only one visitor from the Vale of Glamorgan was recorded in the survey at RSPB Newport Wetlands. Pooling data by all interviewees visiting from home, a core catchment of 6.5km was established for the site, which is broadly similar to the core catchment established for Stroud District (7.7km) and the West of England authorities (7.4km). AECOM recommended to utilise a precautionary, standardised catchment of 7km for the Severn Estuary SAC / SPA / Ramsar in emerging strategic mitigation approaches and AAs.

RLDP Allocations within the Core Recreational Catchment

6.18 The RLDP allocates 7,890 dwellings within the Vale of Glamorgan over the Plan period. However, only a portion of these will be delivered through the allocation of new residential sites. The RLDP also includes large sites with extant planning permission (with 100 dwellings or more remaining) and sites that are rolled forward from the previous RLDP. However, these sites would have been assessed for their environmental impacts in previous HRAs and, therefore, are not reassessed here. This HRA focuses on emerging residential sites that are proposed for allocation in the RLDP.

6.19 Table 6 identifies that two Key Sites lie within the 7km core recreational catchment that has been established for the Severn Estuary SAC / SPA / Ramsar. Therefore, it is likely that at least some of the additional 7,890 dwellings, roughly equating to an increase in 18,936 residents, will regularly contribute to recreational footfall alongside or within the designated site boundary. In line with numerous approaches for other European sites and Local Planning Authorities across the UK, it is recommended that these allocations contribute to targeted mitigation measures, both in terms of Strategic Access Management and Monitoring (SAMM; on-site) and the provision of alternative greenspaces (off-site). It is advised that the overall mitigation requirement associated with the Vale of Glamorgan RLDP is likely to be larger, depending on the final distribution of residential growth set out at the Deposit Plan stage. In addition to the dwellings delivered on key sites, additional homes will be delivered through small- and large-scale windfall developments (1,603 dwellings), and an unspecified quantum of '*additional new housing allocations including affordable led developments*' (p.68 of the RLDP Preferred Strategy). This will likely increase the number of dwellings to be allocated in the 7km core catchment zone surrounding the SAC / SPA / Ramsar. A complete assessment of all allocations will be included in the Deposit Plan HRA.

Table 6: Residential Key Sites allocated in the emerging RLDP for the Vale of Glamorgan.

Site ID	Name	Number of Residential Dwellings Proposed	Number of Additional Residents[100]	Approx. Distance to the Severn Estuary SAC / SPA / Ramsar (km)[101]	Mitigation Required (Yes / No)
440	Land North of Dinas Powys	250	600	2.6	Yes
428	Land at North East Barry	900[102]	2,160	4.8	Yes
427	Land at Readers Way	450	1,080	12.7	No
485	Land East of St Athan	550		16.2	No
457	Land South of B4265			17.1	No
456	Land West of St Athan	600	1,440	17.3	No

Policy Mitigation Contained in the RLDP Preferred Strategy

6.20 The Vale of Glamorgan RLDP recognises the importance of the authority's natural assets and need for their continued protection, maintenance and enhancement. **Policy SP19 (Biodiversity and Ecosystem Resilience)** is the principal mechanism through which European sites will be safeguarded. It specifies that development should improve the resilience and connectivity of ecosystems. For example, to achieve this all developments must:

'*B. Ensure that UK / European protected species and habitats are protected in accordance with statutory requirements.*

C. Protect the integrity of statutory and non-statutory designated sites ensuring that they are properly protected and managed.

D. Be directed away from areas of high ecological value.

E. Incorporate green infrastructure at the early stages of design, that protects and enhances existing site features and improves the connectivity of the ecological network.'

6.21 Overall, Policy SP19 provides a high degree of specificity on how the integrity of ecological networks (which includes the Severn Estuary SAC / SPA / Ramsar) will be protected. Regarding its mitigation potential it should be viewed alongside other policies in the RLDP **Policy SP18 (Green Infrastructure)**, which sets out that developments should protect and enhance high-quality green infrastructure, such as by enhancing connectivity between existing assets, providing amenity open space and facilitating other environments that promote mental and physical health. The delivery of multi-functional greenspace networks is typically regarded as one of the main mechanisms for deflecting recreational pressure from European sites. Generally, the idea behind green infrastructure provision is to create desirable alternative recreation destinations with a view to reduce the number of recreational visits to more sensitive European sites.

[100] Assuming a per-dwelling occupancy of 2.4 persons.
[101] It is to be noted that all Candidate Sites (except for Land North of Dinas Powys) lie closer to the Sully Island SSSI component part of the Severn Estuary SPA / Ramsar than the main estuarine channel itself. However, Sully Island is not readily accessible and, therefore, unlikely to be impacted by recreational pressure resulting from the RLDP.
[102] The site will accommodate up to 1,500 dwellings, of which 900 dwellings will be delivered during the Plan period.

6.22 **Strategic Policy SP4 KS1 (North East Barry)** and **Strategic Policy SP4 KS2 (Land to the North of Dinas Powys, off Cardiff Road)** both include a requirement for the provision and enhancement of appropriate green infrastructure, leisure, sport and recreation space. While this will help absorb some of the recreational pressure associated with the new housing at-source and away from the estuary, it is unlikely that this policy wording alone would extend sufficient protection to the SAC / SPA / Ramsar. In order to represent adequate mitigation, policy wording should have sufficient specificity and identify deliverables that secure effective protection.

Mitigation through an Interim Impact Avoidance Strategy

6.23 It is likely that any housing development delivered in close proximity to the Vale of Glamorgan coastline will increase the visitor pressure in the Severn Estuary SAC / SPA / Ramsar, with potential adverse effects on overwintering birds and qualifying habitats. In line with the broad Interim Impact Avoidance Strategy established for Stroud and recommended for other Welsh authorities, it is advised that a range of avoidance and mitigation measures are deployed within the authority:

- Delivery of Suitable Alternative Greenspaces (SANGs) or smaller scale recreational greenspaces, where possible in close proximity to emerging housing sites (although it is noted that it will be difficult to replicate the feel and attractiveness of the estuary);
- On-site Strategic Access Management and Monitoring (SAMM) measures around key themes of wardening, signage, information boards, education and awareness, zoning and bylaws, and parking provision;
- Collaboration with key stakeholders (e.g. Natural Resources Wales, adjoining authorities and Parish councils) to achieve a coordinated, integrated, sustainable and long-term outcome; and
- Future monitoring of recreation levels to assess changing recreation patterns and abundances / distributions of overwintering birds to assess the effectiveness of mitigation measures.

6.24 For the Deposit RLDP, AECOM will engage with Natural Resources Wales and the Vale of Glamorgan Council ecologist over the need in delivering mitigation for recreational pressure arising from the RLDP. The merit of the above listed mitigation interventions will be discussed. Rather than delivering a Vale of Glamorgan-specific mitigation solution, an alternative approach would be collaboration with other authorities in the core recreational catchment of the Severn Estuary SAC / SPA / Ramsar. For example, Vale of Glamorgan Council (and other authorities, such as Cardiff City Council and Monmouthshire County Council) could become signatories to the existing Interim Impact Avoidance Strategy that was developed for Stroud District in England, which would become formalised and expanded geographically to cover the estuarine coastline in other affected Local Planning Authorities.

Conclusion

6.25 The Vale of Glamorgan RLDP is in the early stages of development and, besides the Key Sites, the geographic location of residential development on additional new housing allocations and windfall sites is not yet specified. Therefore, this impact pathway will need to be revisited in the Deposit Plan HRA, when the precise distribution of residential allocations is known. Furthermore, additional policies will likely be introduced, some of which may provide a mechanism for mitigation in relation to recreational pressure in the Severn Estuary SAC / SPA / Ramsar. **At the time of writing, adverse effects of the Vale of Glamorgan RLDP on the Severn Estuary SAC / SPA / Ramsar regarding recreational pressure cannot be excluded.** This conclusion will be reassessed in the Deposit Plan HRA.

In-Combination Assessment

6.26 Potential impacts of recreational pressure may be increased when considered in-combination with the residential growth allocated in other authorities adjoining the Severn Estuary SAC / SPA / Ramsar. However, it is considered that the Vale of Glamorgan will require mitigation ‘alone’, which will entirely address any adverse effects arising from the RLDP. Furthermore, the planning process requires each strategic development plan to undergo, meaning that other authorities in the core catchment of the estuary will also need to deliver mitigation to address negative recreational pressure effects. Therefore, provided that the Vale of Glamorgan RLDP mitigates its

own impact (see previous sections), there is no potential for in-combination effects on the Severn Estuary SAC / SPA / Ramsar.

Cardiff Beech Woods SAC

6.27 The Cardiff Beech Woods SAC is designated for two woodland habitat types, namely *Asperulo-Fagetum* beech forests and *Tilio-Acerion* forests of slopes, screes and ravines (the latter being a priority feature). Trees, particularly ancient and veteran trees, and their associated ground flora are sensitive to negative impacts from recreational use, such as direct trampling damage and soil compaction surrounding root zones. For example, trampling and soil compaction reduces pore spaces and the ability of soil to hold water. This potentially limits the uptake of water and essential minerals through the root network of trees. Furthermore, the heavy usage of habitats of conservation importance by dog walkers has also been linked with nutrient enrichment by nitrogen and phosphorus deposited in dog faeces. If sufficiently great, over time this fertilisation effect has the potential to change local plant community composition – typically towards species of lower conservation value.

6.28 NRW's Core Management Plan identifies recreational use as a performance indicator potentially affecting both qualifying woodland types. The site experiences heavy recreational pressure along its network of path and bridleways (particularly the Castell Coch SSSI and Fforestganol a Chwm Nofydd SSSI component parts), with some areas being specifically managed for public use. However, recreational patterns within the SAC have not been fully explored and any current adverse impacts on the qualifying habitats are unclear. NRW note that '*access issues need to be kept under review*', but no Operational Limits regarding recreational pressure have been set.

6.29 Key attractions within the Castell Coch Woodlands are the Taff train and historic building of Castell Coch. While these features may increase the access pressure on the woodlands, they are also considered to act as focal point and concentrate access to well defined limits within the site. This will serve to concentrate recreation-related impacts to limited areas, while protecting sensitive habitat features and natural woodland processes in other parts of the site. Currently, visitor management of the woodlands focuses on maintaining the network of public footpaths and access routes to high standards. This is important in discouraging visitors from seeking out new routes with the potential for formation of desire lines and spreading of impacts onto sensitive habitats. NRW, in collaboration with Cardiff County Council and individual landowners, is managing the balance between nature conservation importance, recreational use and cultural heritage.

6.30 By virtue of its steep terrain, recreational use within the *Tilio-Acerion* forests of screes, ravines and slopes is inherently limited. Notwithstanding this, recreation in some component SSSIs supporting this habitat has been growing, meaning that this impact pathway still requires assessment. As discussed in relation to the *Asperulo-Fagetum* woodland, access management primarily centres around maintaining / enhancing the extensive network of public footpaths and bridleways to facilitate natural woodland regeneration in more remote parts of the SAC.

6.31 At approx. 3.4km to the closest part of the SAC, the Vale of Glamorgan lies within a typical 5km core catchment that is characteristic for other inland terrestrial European sites in the UK. While this is considered too far for the average person to walk, it falls within a routine driving distance for car-based visitors. Notwithstanding this, it should also be noted that the northern part of the Vale of Glamorgan, the part closest to the SAC, supports a relatively low population density. The most populous settlements in the authority (the Key Settlement, Service Centre Settlements and Primary Settlements that most growth will be directed to) lie in the south and south-west of the Vale of Glamorgan, at considerably greater distances to the SAC. For example, the closest Key Site allocated in the RLDP Preferred Strategy (Land North of Dinas Powys) lies approx. 10.4km from the closest part of the Cardiff Beech Woods SAC (Garth Wood SSSI). This is well beyond a 5km core catchment adopted for woodland sites. As highlighted in the previous section, further residential development will come forward on additional allocations and windfall sites. While it cannot be excluded that new dwellings within 5km of the SAC will come forward under the Deposit RLDP, any such quantum is likely to be low.

6.32 There is some uncertainty regarding the current recreational baseline and potential negative impacts to qualifying habitats within the Cardiff Beech Woods SAC. Notwithstanding this, due to the geographic distribution of residential growth, it is considered extremely unlikely that the Vale

of Glamorgan RLDP will make a significant contribution to any deviation from the current recreational baseline. Therefore, there will be no adverse effects of the Vale of Glamorgan RLDP on the Cardiff Beech Woods SAC regarding recreational pressure, both alone and in-combination. There is no need for RLDP-specific policy mitigation in relation to this impact pathway and European site.

In-Combination Assessment

6.33 As discussed in the previous sections, due to the geographic distribution of the Key Sites allocated in the RLDP, it is considered very unlikely that the Vale of Glamorgan contributes significantly to the recreational burden in the Cardiff Beech Woods SAC. Given this, it is also concluded that the RLDP will not make a material contribution to any in-combination recreational pressure effects. Furthermore, those authorities that contribute significantly to the recreational burden, will need to provide bespoke measures to mitigate their impacts on the qualifying woodland. Overall, the Vale of Glamorgan RLDP will not result in in-combination recreational pressure impacts on the Cardiff Beech Woods SAC.

Water Quality

Severn Estuary SAC / SPA / Ramsar

Treated Sewage Effluent

6.34 Owing to the location of the Vale of Glamorgan adjoining the Severn Estuary SAC / SPA / Ramsar, LSEs of the RLDP on the estuarine complex could not be excluded in the previous chapter. Natural England's Site Improvement Plan (SIP), which summarises pressures and threats to both the Welsh and English parts of the estuary, species water pollution as an important issue for the estuary. It states that '*there is uncertainty over water quality in the Estuary due to diffuse (including agricultural) or direct pollution (eg. Industrial, sewage treatment works, thermal, radioactive)… Macrophytobenthos (benthic macro algae) have been identified in localised hotspots and may be having adverse impacts on the invertebrate communities there. The extent of issues like this, the presence and mobilisation of a range of contaminants and reasons behind the moderate statuses need to be understood.*' While there appear to be remaining uncertainties over water quality in the estuary, its setting amidst urban development centres clearly implies that any existing water-related pressures on the estuary are likely to increase, particularly when considering the projected cumulative across Welsh and English authorities.

6.35 Estuarine ecosystems represent receiving 'end points' in terms of wastewater and industrial discharge. Waterbodies that pass WwTWs, industrial developments and impermeable surfaces inland from the estuary collect non-toxic and toxic substances, carrying these to estuaries many kilometres downstream within their hydrological catchments. While the overall travel distance of freshwater in river bodies and mixing with seawater in the estuary itself will provide a degree of natural attenuation, it is nonetheless considered that water pollutants accumulate in the water column and sediments of estuaries. The Severn River Basin Management Plan (SRBMP) highlights that 83% of the waterbodies flowing into the Severn Estuary SAC / SPA / Ramsar have moderate ecological status, with only 17% receiving good ecological status. This status quo is at clear odds with the targets set out in the Water Framework Directive (WFD), which aims to restore all rivers (and associated flora and fauna) to good ecological status.

6.36 Natural Resources Wales' Water Watch Wales website was consulted to assess the current water quality baseline in the Severn Estuary SAC / SPA / Ramsar. In the Cycle 3 WFD assessment, the Lower Severn transitional waterbody is identified as having moderate hydrochemical and ecological status (noting that the overall classification for fish is 'good'). According to available data, there are two waterbodies feeding into the wider setting of the estuary. The River Ely runs northward along the Vale of Glamorgan, feeding into the estuary to the north of Penarth. According to the Cycle 3 WFD assessment, this section of the river (Ely River – confluence Nant Clun to Allot Gardens) has overall moderate chemical and poor ecological status, particularly due to 'poor' status for invertebrates and fails for several fish species. The River Cadoxton (which encompasses its headwaters to its tidal limit) is attributed moderate scores for hydrochemistry and ecology, primarily due to unfavourable DO concentrations. However, the R. Cadoxton joins the Bristol Channel to the south-east of Barry, approx. 3.6 miles in flowpath difference from the Severn Estuary SAC / SPA / Ramsar. Given the open nature and mixing effect of the marine

environment, it is considered unlikely that the water quality in the R. Cadoxton has a meaningful impact on water quality in the SAC / SPA / Ramsar.

6.37 A review of waterbodies surrounding the Cog Moors WwTW, indicates that treated sewage is most likely to be discharged to Sully Brook. This rises in Cosmeston, joining R. Cadoxton to the south of Palmerstown. Given the distance between the point where the R. Cadoxton flows into the Bristol Channel and the Severn Estuary SAC / SPA / Ramsar, it is unlikely that there is any material hydrological link between treated sewage effluent resulting from the RLDP and the designated site. Overall, therefore, adverse effects of the Vale of Glamorgan RLDP on the Severn Estuary SAC / SPA / Ramsar regarding water quality impacts from treated sewage effluent can be excluded. For the Deposit Plan HRA, AECOM will liaise with Vale of Glamorgan District Council and Welsh Water to obtain a comprehensive list of the WwTWs that will serve development allocated in the RLDP. If any WwTWs in hydrological continuity with the Severn Estuary SAC / SPA / Ramsar are identified at the Deposit Plan stage, an adequate policy mechanism would be required to safeguard the estuary from the negative impacts of additional sewage.

Surface Runoff

6.38 Large volumes of untreated surface runoff can further deteriorate the water quality in aquatic ecosystems that are already under pressure from point-source pollution, such as WwTWs and industrial developments. As highlighted in the LSEs Screening chapter, surface runoff from developments along the Vale of Glamorgan coastline could materially contribute to the pollutant loading in the Severn Estuary SAC / SPA / Ramsar. While no Key Sites are allocated in close proximity to the estuary, there is the potential that further site allocations and extensive windfall could be developed within its surface water catchment. Therefore, it is considered important that an adequate policy mechanism exists to protect the SAC / SPA / Ramsar from surface water impacts.

6.39 **Policy SP19 (Biodiversity and Ecosystem Resilience)** in the Preferred Strategy RLDP is the main mechanism for protecting biodiversity and ecosystem resilience in the Vale of Glamorgan, which would include the water quality in European sites. Most importantly, the policy specifies that all developments must '*B. Ensure that UK/European protected species and habitats are protected in accordance with statutory requirements. C. Protect the integrity of statutory and non-statutory designated sites ensuring that they are properly protected and managed.*'

6.40 Negative ecological impacts from surface runoff are primarily mitigated by deploying Sustainable Drainage Systems (SuDS), which aim at reducing runoff to greenfield rates, increasing storage times, mixing / diluting pollutants and attenuating relevant substances through uptake into plant tissue. Policy SP19 already includes some important wording in relation to this: '*F. Incorporate nature-based solutions within development to support biodiversity and build ecosystem resilience within the site and the wider area.*' SuDS measures fall under nature-based solutions and are increasingly becoming the norm in new developments.

6.41 To ensure that the Severn Estuary SAC / SPA / Ramsar is protected from runoff-related water quality impacts, the full set of allocations will be assessed regarding their distance to the estuary at the Deposit Plan stage. Following review of the policy framework provided in the Deposit RLDP, it may be advised that more specific wording in relation to SuDS measures is included to protect the Severn Estuary SAC / SPA / Ramsar. **At the time of writing, adverse effects of the Vale of Glamorgan RLDP on the Severn Estuary SAC / SPA / Ramsar regarding water quality impacts from surface runoff cannot be excluded.** This conclusion will be reassessed in the Deposit Plan HRA.

Kenfig SAC

Treated Sewage Effluent

6.42 The Kenfig SAC sites alongside the Vale of Glamorgan in the adjoining authority of Bridgend. Several of the qualifying features in the SAC depend on suitable water quality and, therefore, LSEs of the Vale of Glamorgan RLDP on the SAC could not be excluded in the previous chapter. Natural Resources Wales' Core Management SAC indicates that the dune slacks and Kenfig Pool are primarily groundwater-fed, with potential input from a deep Carboniferous Limestone aquifer. Furthermore, there are three small ephemeral streams that contribute to Kenfig Pool. While this does not indicate that major surface waterbodies contribute to the water quality in the

SAC, this AA assumes some hydrological connectivity to the R. Ogmore, which adjoins the SAC and straddles the border between the Vale of Glamorgan and the authority of Bridgend. A hydrological link between the R. Ogmore and the Kenfig SAC may be more prominent at times of high rainfall, when water levels within the river are higher and overtopping of the riverbanks could occur.

6.43 One WwTW (Pen-Y-Bont, Merthyr Mawr) adjoins the Kenfig SAC and is situated to the north of the R. Ogmore in the authority of Bridgend. It serves a population of greater than 2,000 and discharges treated sewage effluent into the R. Ogmore, which flows past the SAC immediately downstream. According to Cycle 3 data on the Water Watch Wales website, the transitional Ogmore Estuary waterbody is classified as having moderate ecological and high (i.e. good) water quality status. However, dissolved inorganic nitrogen (DIN) levels are identified as moderate. High DIN levels are likely to derive from several sources, including diffuse agricultural pollution and point-sources (e.g. WwTWs and industrial developments). The Merthyr Mawr WwTW and other WwTWs further upstream will inevitably contribute to the elevated nutrient concentrations in the R. Ogmore and, potentially, in the Kenfig SAC. A hydrological link between the R. Ogmore and the SAC is more likely due to the nature of the underlying limestone aquifer. Its high permeability implies that water quality impacts arising at considerable distances may have an impact on the SAC. Potential negative impacts from treated sewage effluent are coming under scrutiny due to recently discovered elevated nitrogen levels at Burrows Well (a karstic spring) and dune slacks becoming increasingly eutrophic.

6.44 At the time of writing, it is unclear whether Peny-Y-Bont, Merthyr Mawr WwTW is serving any current or future developments within the Vale of Glamorgan. The WwTW lies in the authority of Bridgend and any connecting wastewater infrastructure would need to cross the R. Ogmore. AECOM is liaising with Welsh Water to confirm this for the Deposit Plan HRA. Another critical factor is whether the emerging RLDP would allocate any new housing or employment sites in the geographic area served by this WwTW. The closest Key Site allocated in the Preferred Strategy RLDP (Land West of St Athan) lies approx. 15.6km to the east of the Kenfig SAC, with another WwTW (Llantwit Major) situated much closer. While connection to WwTWs does not solely depend on geographic proximity, the shortest routes would typically be chosen for economic and logistic reasons. Furthermore, some additional site allocations and the distribution of windfall development will only be known at the Deposit Plan stage. Therefore, it cannot be excluded with certainty that developments in the geographic area served by Pen-Y-Bont, Merthyr Mawr WwTW will be coming forward. If this were the case, then it is considered that specific policy wording would be required to ensure that there will be no negative water quality impacts within the SAC. The recommended wording would likely encompass liaison with Welsh Water to ensure that sufficient headroom is available at relevant WwTWs to accommodate the additional volume of sewage effluent generated by the RLDP. This may require the phased delivery of developments to remain in sync with available sewage treatment capacities, where relevant.

6.45 **At the time of writing, adverse effects of the Vale of Glamorgan RLDP on the Kenfig SAC regarding water quality cannot be excluded.** This is due to uncertainties over the area served by Pen-Y-Bont Merthyr Mawr WwTW (a WwTW in close proximity to the SAC)[103] and the final suite of allocations that will be taken forward in the Deposit RLDP. Therefore, this impact pathway will need to be revisited in the Deposit Plan HRA, when the required evidence base will be available.

Surface Runoff

6.46 Large volumes of untreated surface runoff can further deteriorate the water quality in aquatic ecosystems that are already under pressure from point-source pollution, such as WwTWs and industrial developments. As highlighted in the LSEs Screening chapter, surface runoff from developments within the north-west part of the Vale of Glamorgan could materially contribute to the pollutant loading in the Kenfig SAC. While no Key Sites are allocated in close proximity to this coastal site, there is the potential that further site allocations and extensive windfall could be developed within its surface water catchment. Therefore, it is considered important that an adequate policy mechanism exists to protect the SAC from surface water impacts.

[103] AECOM is in the process of liaising with Welsh Water to confirm whether this WwTW serves development in the Vale of Glamorgan.

6.47 **Policy SP19 (Biodiversity and Ecosystem Resilience)** in the Preferred Strategy RLDP is the main mechanism for protecting biodiversity and ecosystem resilience in the Vale of Glamorgan, which would include the water quality in European sites. Most importantly, the policy specifies that all developments must '*B. Ensure that UK/European protected species and habitats are protected in accordance with statutory requirements. C. Protect the integrity of statutory and non-statutory designated sites ensuring that they are properly protected and managed.*'

6.48 Negative ecological impacts from surface runoff are primarily mitigated by deploying Sustainable Drainage Systems (SuDS), which aim at reducing runoff to greenfield rates, increasing storage times, mixing / diluting pollutants and attenuating relevant substances through uptake into plant tissue. Policy SP19 already includes some important wording in relation to this: '*F. Incorporate nature-based solutions within development to support biodiversity and build ecosystem resilience within the site and the wider area.*' SuDS measures fall under nature-based solutions and are increasingly becoming the norm in new developments.

6.49 To ensure that the Kenfig SAC is protected from runoff-related water quality impacts, the full set of allocations will be assessed regarding their distance to these dune systems at the Deposit Plan stage. Following review of the policy framework provided in the Deposit RLDP, it may be advised that more specific wording in relation to SuDS measures is included to protect the Kenfig SAC. **At the time of writing, adverse effects of the Vale of Glamorgan RLDP on the Kenfig SAC regarding water quality impacts from surface runoff cannot be excluded.** This conclusion will be reassessed in the Deposit Plan HRA.

In-Combination Assessment

6.50 Adverse effects of the Vale of Glamorgan RLDP 'alone' on the Severn Estuary SAC / SPA / Ramsar and Kenfig SAC regarding water quality (both from treated sewage effluent and surface runoff) could not be excluded at the Preferred Strategy stage. Any treated sewage effluent and surface runoff from other authorities in the hydrological catchment of these European sites would have the potential to exacerbate negative water quality impacts. However, this impact pathway will be revisited for the Deposit RLDP, when the distribution of growth will be finalised. Should any adverse effects resulting from the Vale of Glamorgan RLDP be identified, policy mechanisms (e.g. relating to adequate WwTW infrastructure and / or SuDS) will be required, which will entirely address any impacts from the RLDP. Strategic development plans from other authorities will also be subject to HRA and be required to deliver adequate mitigation regarding any water quality impacts. Overall, therefore, the Vale of Glamorgan RLDP will have no negative impacts on water quality in-combination with other plans and projects.

Water Quantity, Level and Flow

Kenfig SAC

6.51 As highlighted in the Screening for LSEs chapter, the Kenfig SAC depends on a natural hydrological regime to sustain its qualifying dune system and Kenfig Pool. A significant deviation from the required hydrological baseline could lead to drying up of wet dune and lake habitat, with negative impacts on their characteristic plant assemblages. The primary mechanism through which the emerging Vale of Glamorgan RLDP could impact the SAC is due to the statutory supply of potable water to all new developments.

6.52 Welsh Water is the company responsible for the public water supply across large parts of Wales. All water suppliers are under a legal requirement to publish 5-yearly Water Resources Management Plans (WRMPs), detailing how the projected water requirements across their water supply zones will be met without harmful environmental impacts. WRMPs take a range of important factors into account when deriving their projections, including changing water availability due to climate change impacts, environmental needs and population-level behavioural changes. Therefore, these documents are as precautionary as possible, given the quality of data available for analysis.

6.53 Currently, Welsh Water is developing its WRMP to 2024, taking account of the latest climate change and growth projections for its supply area. The water company serves a population of approx. 1.3 million households and businesses across Wales, Herefordshire and parts of

Deeside. Over the last 25 years, the quantity of water supply to Welsh Water customers, and therefore the total volume of freshwater excluded from the environment, has reduced from an average of over 1,000 million litres per day (Ml/d) to about 850Ml/d. This is due to a combination of reduced leakage, demand from heavy industries and individual customers. Pressure on water resources is highest in the major cities, towns and surrounding conurbations of south Wales.

6.54 Wales receives a significant amount of rain that provides for regular replenishment of freshwater bodies. According to Welsh Water, only approx. 3% of the effective rainfall is captured with the remaining volume left for the environment and agriculture. In comparison, in areas with high water scarcity such as south-east England, roughly 50% of the effective rainfall are used for the public water supply. Potable water supplied by Welsh Water comes from a range of sources, including impounding reservoirs, abstractions from lowland rivers (e.g. Rivers Wye, Usk, Tywi, Cleddau and Teifi) and groundwater abstractions (less than 5% of the water requirements at company level). Notwithstanding this, the proportion of sources contributing to water supply at the local level may considerably differ, with some areas receiving all their water from groundwater sources.

6.55 At its core, the WRMP24 aims to provide the strategic basis for securing customer water demand over the next 25 years, particularly in light of climate change and increasing pressures from droughts. The key aims of the WRMP are:

- Demonstrating reliable water resources and treatment capacity to meet future demand over the next 25 years (this would include any projected population growth delivered by the Vale of Glamorgan RLDP);
- Meeting any Government targets regarding drought resilience and accounting for latest climate change science (UKCP18 datasets); and
- Securing sufficient long-term water availability for the environment by taking account of environmental obligations set out by regulators as a minimum.

6.56 For management purposes, Welsh Water's operational area is divided into 23 discrete Water Resource Zones (WRZs), within each of which the available water resources are shared and all customers are subject to the same risk of outages in response to events such as severe droughts. The Vale of Glamorgan is divided between two of the WRZs, specifically the Tywi Gower and the South-East Wales Conjunctive Use System (SEWCUS) WRZs. Welsh Water have generated supply-demand balances for each of the WRZs to evaluate whether the available resources are sufficient to meet projected demand. Under a 1 in 200-year level of drought resilience, both the Tywi Gower (28Ml/d) and SEWCUS (44Ml/d) WRZs are projected to be in a supply-demand deficit within the 25-year period to 2050. Therefore, using precautionary modelling scenarios and best available scientific evidence, management interventions will be required to meet the forecast demand of the south Wales population (including future Vale of Glamorgan residents) to 2050.

6.57 Further research has been undertaken to identify the Preferred Options for addressing the supply-demand balance in the two WRZs covered by the Vale of Glamorgan. For the SEWCUS WRZ it has been identified that limitations in network connectivity between high-level reservoir systems and low-level storage systems are key factors in determining the supply-demand deficit. Two schemes that address this zonal connectivity issue and increase zonal resilience are to be carried out. However, both schemes relate to how water is transported and stored within company infrastructure, rather than increasing abstraction from specific surface or groundwater sources. It is considered that there is no potential for the chosen supply-side options for the SEWCUS WRZ to affect hydrological conditions in the Kenfig SAC.

6.58 A similar pattern is evident for the Tywi Gower WRZ, where the forecast supply-demand deficit is also the consequence of network connectivity rather than insufficient water available for use (WAFU). Two of the company's water storage reservoirs (Ystradfellte and Crai) fall to very low levels under dry weather and, due to limitations in connectivity, cannot be offset by surplus water in another reservoir (Llyn Brianne). The Preferred Options proposed by Welsh Water include improvements and increases to capacity at relevant pumping stations (and connected Water Treatment Works), none of which propose an increase in abstraction volumes beyond currently consented limits. Welsh Water projects that implementation of these supply-side options would bring the supply-demand balance into a surplus of over 50Ml/d by 2050.

6.59 Overall, this AA has shown that the options required to meet the future potable water demand of the south Wales population (including any growth due to the Vale of Glamorgan RLDP) would not require the use of any additional surface or groundwater sources beyond currently consented limits. Therefore, the RLDP will not lead to adverse effects on the Kenfig SAC regarding impacts on water quantity, level and flow, either alone or in-combination.

Severn Estuary SAC / SPA / Ramsar

6.60 The Severn Estuary SAC / SPA / Ramsar is an estuarine ecosystem that depends on the complex interplay between freshwater and saltwater input. While tidal flushing is a key dynamic force shaping habitat conditions in any estuary, many freshwater sources (both small and large) will also play a role in habitat dynamics. Natural England's and Natural Resources Wales' joint Regulation 33 advice note highlights several processes related to freshwater supply that may impact upon SPA / Ramsar birds. None of these processes represent direct harmful impacts on the birds themselves, but rather indirect impacts via supporting habitats and prey items that the birds depend upon. Reduced freshwater supply to the estuary could lead to changes in the volume of suspended sediments, increased desiccation, reduced water flow rates, changes in nutrient loading and increased salinity. For example, an increase in salinity within Atlantic saltmarsh would alter the existing zonation of plant communities, with potential knock-on effects on bird species that graze in this habitat (e.g. Bewick's swan, white-fronted goose).

6.61 The provision of 8,679 dwellings and 67.8ha of employment land implies that the Vale of Glamorgan RLDP will clearly result in an increased consumption of potable water. Depending on how this additional demand will be met, there is the potential that this would reduce the volume of freshwater available to the environment, including the Severn Estuary SAC / SPA / Ramsar. The exploitation of water resources may also directly impact the estuarine environment, if supply-side options developed by the water company involved desalination plants.

6.62 As discussed in relation to the Kenfig SAC, Welsh Water is the company responsible for the potable water supply across large parts of Wales, including the Vale of Glamorgan. The WRMP published by Welsh Water identifies that a portion of the potable water supplied to its customers originates from lowland reaches of the R. Wye and R. Usk, both of which are in hydrological continuity with the Severn Estuary SAC / SPA / Ramsar. Any resource options that increase abstraction volumes beyond existing consents would, therefore, have the potential to significantly reduce freshwater supply to the estuary.

6.63 The relevant content of the WRMP was extensively discussed in relation to the Kenfig SAC. In summary, the Vale of Glamorgan is covered by two WRZs (SEWCUS and Tywi Gower), both of which are modelled to enter a supply-demand balance deficit in the period to 2050. However, analyses undertaken by Welsh Water have shown that the projected deficit is a consequence of inadequate network connectivity rather than insufficient WAFU. Therefore, the supply-side options that have been taken forward to address the supply-demand deficit solely improve network connectivity. The WRMP does **not** propose any increase in abstraction volumes at existing sources or the development of new sources (including desalination plants).

6.64 Overall, therefore, adverse effects of the Vale of Glamorgan RLDP on the Severn Estuary SAC / SPA / Ramsar regarding impacts on water quantity, level and flow can be excluded. No additional policy wording is required in relation to this impact pathway.

In-Combination Assessment

6.65 WRMPs and the options delivered to ensure adequate water supply to all emerging residential and industrial developments, inherently have an in-combination scope. In this instance, it was shown that the growth allocated in the Vale of Glamorgan has no potential for the drawdown of freshwater resources in the Kenfig SAC and Severn Estuary SAC / SPA / Ramsar. Given that there is no negative impact potential associated with the Vale of Glamorgan RLDP regarding water quantity, level and flow, there is no possibility of in-combination effects to arise.

Loss of Functionally Linked Habitat

Severn Estuary SPA / Ramsar

6.66 As identified in the Screening for LSEs chapter, the mobile qualifying species in the Severn Estuary SPA / Ramsar likely routinely travel beyond the designated site boundary for foraging and / or roosting. Off-site habitat parcels differ considerably in their importance to the qualifying species of the Severn Estuary SPA / Ramsar. For example, wooded or scrubby habitat parcels are not considered to hold much ecological value, while improved / wet grassland and agricultural fields may be routinely visited. Whether or not a specific habitat parcel is concluded to be functionally linked to a European site also depends on various other parameters. Habitats are considered to be functionally linked where they support a meaningful proportion of the designated population (typically taken to be 1% of the qualifying population of a given species). Functional linkage also becomes more evident if the site regularly exceeds this critical population threshold, rather than qualifying birds being present only on a single occasion.

6.67 The dependence of a species on land outside a European site boundary is predominantly dictated by its foraging ecology, as a consequence of which there is considerable variation in the degree of dependence between SPA / Ramsar species. Many overwintering swan and goose species have strong associations with habitats outside European sites, particularly with low-lying wet pasture and agricultural stubble, where they feed on plant material including tubers, shoots and leaves. For example, white-fronted goose forage on a wide range of plant material, grasses, clover, spilt grain, winter wheat and potatoes. While this species also forages in peat bogs, dune grassland and saltmarsh, its use of agricultural grasslands and stubble has been increasing in recent years. In contrast, the dependence of waders is often less pervasive, with most habitat use being limited to intertidal mudflats and rocky shores. For example, dunlin preferentially feed on marine invertebrates in intertidal muds (e.g. ragworms, *hydrobia* snails). Only if severe storms impact these primary habitats do some birds revert to foraging on inland fields, where they target earthworms and other soil invertebrates. Redshank primarily winter in close proximity to the coast, favouring *Hydrobia* and *Corophium* spp. in mudflats, estuaries and muddy river channels. Smaller numbers (likely below 1% of qualifying populations will occur near inland lakes and large rivers. In reality, the off-site habitats predominantly utilised by waders (i.e., intertidal habitats, rocky shores and inland waterbodies) are unlikely to be lost as a result of RLDP growth. Most residential and industrial development that is allocated in strategic plans will avoid these habitats for deliverability reasons. Table 7 provides a full assessment of supporting habitat requirements of the qualifying species in the Severn Estuary SPA / Ramsar.

Table 7: Qualifying individual species in the Severn Estuary SPA / Ramsar and their dependence on functionally linked habitats outside the designated site boundary.

Species	Description of foraging and / or roosting habits	Overall dependence on functionally linked habitats
Bewick's swan *Cygnus columbianus bewickii*	Key supporting habitats are intertidal sand- and mudflats, and saltmarsh (feed on the transition between saltmarsh and coastal grazing marsh. This species grazes on a range of 'soft' meadow grasses (e.g. *Agrostis stolonifera*, *Alopecurus geniculatus*) in wet meadows outside the designated site boundary.	High
White-fronted goose *Anser albifrons albifrons*	Roost on estuarine sandbanks at night and typically fly up to 10km to daytime feeding grounds.	High

	Graze on a range of saltmarsh grasses and herbs, such as common saltmarsh grass *Puccinellia maritima* and sea barley *Hordeum marinum*. Mainly in the transition between saltmarsh and coastal grazing marsh in front of sea defences in the upper estuary (The Dumbles). Supporting habitats outside the designated site boundary may include permanently wet herb-rich fen pasture fields as well as agricultural fields (e.g. barley stubble).	
Dunlin *Calidris alpina alpina*	Distributed widely throughout the estuary, where they feed on marine polychaete worms. Crustaceans and molluscs (e.g. Baltic tellin *Macoma balthica*) Foraging / roosting in supporting habitats, such as freshwater coastal grazing marsh, improved grassland and open standing waters (particularly at high tide and on the English side of the estuary) – most supporting habitats are included in the SPA designation	Low
Redshank *Tringa tetanus*	Distributed widely throughout the estuary, where they feed on marine polychaete worms. Crustaceans and molluscs (e.g. Baltic tellin *Macoma balthica*) Foraging / roosting in supporting habitats, such as freshwater coastal grazing marsh, improved grassland and open standing waters (particularly at high tide and on the English side of the estuary) – most supporting habitats are included in the SPA designation	Low
Shelduck *Tadorna tadorna*	Shelduck primarily forage on the rich invertebrate assemblages in intertidal mudflats (*Hydrobia* spp., *Mytilus edulis* and the common shore crab *Carcinus maenas*)	Medium

	Roosting and moulting habitats also in the estuary, such as in Bridgwater Bay	
Gadwall *Anas strepera*	Forage in intertidal areas that receive freshwater inflow from streams and pills. Taking animal material including aquatic insects, molluscs, annelids, small fish and amphibians. However, as freshwater plant feeders, they are expected to forage in freshwater bodies (including areas outside the designated site boundary).	Medium

6.68 The likelihood that a greenfield site represents functionally linked habitat reduces with distance from designated site boundaries. Generally, the further a site lies from the important roosts, the fewer individuals will undertake that 'commute' and lower proportion of a qualifying population will be supported. Government organisations for environmental protection in other countries have published guidance on the potential impact distance associated with different types of development. For example, Natural England have provided guidance on the extent of functionally linked habitat used by designated bird populations and identified Impact Risk Zones (IRZs) for different bird groups[104]. Wintering waders in Bird Group 3 have a maximum foraging distance of 2km, which implies that redshank and dunlin would be restricted to a relatively narrow band north-west of the Severn Estuary. White-fronted goose and Bewick's swan in Bird Group 6 have maximum foraging distances of 10km, which is based on GIS distribution records, WeBS data and BirdTrack information. Scottish Natural Heritage (SNH) have provided core foraging ranges for various designated species in Scotland[105], including dunlin (500m) and white-fronted goose (5-8km). It is to be noted that these ranges should only act as a rough starting point for assessment, rather than for setting specific bird survey requirements.

6.69 The Vale of Glamorgan RLDP allocates several Key Sites delivering substantial growth in the authority. All Key Sites are much larger than 2ha (the minimum plot size required to realistically support 1% of a qualifying population) and comprise arable land. Given these general features, there is clearly the potential that at least some of the Key Sites **could** be functionally linked to the Severn Estuary SPA / Ramsar. Table 8 assesses the characteristics of all Key Sites allocated in the RLDP in more detail and provides an overall conclusion on their likely suitability as functionally linked habitat to the qualifying species in the SPA / Ramsar.

Table 8: Summary of Key Sites allocated in the Vale of Glamorgan RLDP and important parameters for establishing potential functional linkage to the Severn Estuary SPA / Ramsar.

Key Site Name	Key Site ID	Areal extent (ha)	Distance to Severn Estuary SPA / Ramsar (km)	Habitats present on site	Other characteristics	Potential for functional linkage to Severn Estuary SPA / Ramsar
Land North of Dinas Powys	440	13.1	2.5	Improved / semi-improved grazing	Sight- and flightlines from / to the SPA / Ramsar	Medium – High

[104] Knight M. (March 2019). Impact Risk Zones Guidance Summary – Sites of Special Scientific Interest Notified for Birds. Version 1.1. 8pp.
[105] Scottish Natural Heritage. (June 2016). Assessing Connectivity with Special Protection Areas (SPAs) – Guidance. 4pp. Available at: https://www.nature.scot/sites/default/files/2022-12/Assessing%20connectivity%20with%20special%20protection%20areas.pdf [Accessed on the 17/04/2023]

			land and arable fields	interrupted by development (Penarth). Relatively poor sightlines for early threat detection due to treelines separating individual arable plots.	
Land at North East Barry	428	70	4	Improved / semi-improved grazing land and arable fields	Sight- and flightlines from / to the SPA / Ramsar interrupted by development (Penarth, Sully). Relatively clear sightlines for early threat detection, although short hedgerows separating individual arable / grazing plots are present.	Medium – High
Land at Readers Way	427	24	10.4	Arable fields	Sight- and flightlines from / to the SPA / Ramsar interrupted by development (Barry). Relatively clear sightlines for early threat detection within the site itself, although short hedgerows separating individual arable plots are present. Directly adjoining existing housing and Cardiff Airport, suggesting that disturbance due to noise and visual stimuli is high.	Low
Land East of St Athan	485	15.8	14	Improved / semi-improved grazing land and arable fields	Sight- and flightlines from / to the SPA / Ramsar interrupted by development (Rhoose, Cardiff Airport, Barry).	Low

				Relatively clear sightlines for early threat detection within the site itself, although short hedgerows separating individual arable plots are present.	
Land South of 457 B4265	1.5	14.9	Improved / semi-improved grazing land	Sight- and flightlines from / to the SPA / Ramsar interrupted by development (Rhoose, Cardiff Airport, Barry). Habitat parcel is surrounded by development in the form of housing, road infrastructure and train track.	Low
Land West of 456 St Athan	28	15	Improved / semi-improved grazing land and arable fields	Sight- and flightlines from / to the SPA / Ramsar interrupted by development (Rhoose, Cardiff Airport, Barry). Relatively clear sightlines for early threat detection within the site itself, although short hedgerows separating individual arable plots are present. Directly adjoining an existing train route and MOD St. Athan, suggesting that disturbance due to noise and visual stimuli is high.	Low

6.70 It is to be noted that the Vale of Glamorgan seeks to deliver some of its projected growth on rolled forward LDP sites and large sites with extant planning permission. This is positive because both sets of sites would have been previously assessed for their importance as supporting habitats for birds and it reduces the land requirements of the RLDP. However, while the Preferred Strategy RLDP seeks to re-use previously developed brownfield land wherever possible, all allocated Key Sites comprise previously undeveloped greenfield sites. Furthermore, the distribution of additional site allocations and greenfield sites, and associated land requirements are not yet known.

6.71 To minimise the potential for the emerging RLDP to result in the loss of functionally linked habitat, it is recommended that the following text (or similar) is inserted to an appropriate policy of the Deposit Plan: '***To meet the requirements of the Conservation of Habitats and Species Regulations 2017 (as amended), the applicant is required to provide evidence that development will not result in adverse effects on the integrity of the Severn Estuary SPA / Ramsar regarding the loss of functionally linked habitat. To demonstrate this, a survey of the habitats on site is required. Where habitats are suitable, non-breeding bird surveys to determine whether the site constitutes functionally linked habitat (defined as supporting close to or above 1% of the any qualifying population) must be undertaken. These will need to cover autumn, winter and spring to capture the core overwintering as well as any passage periods. If habitat within the site is identified to support significant populations of designated bird species, avoidance measures and mitigation will be required, and the planning application will likely need to be assessed through a project-specific Habitats Regulations Assessment.***'

6.72 Provided that this policy wording is included in the Deposit Plan HRA, it would be concluded that the Vale of Glamorgan RLDP does not result in adverse effects on the integrity of the Severn Estuary SPA / Ramsar regarding the loss of functionally linked habitat. This impact pathway will be revisited at the Deposit Plan stage, when the additional site allocations and some windfall sites will be available for assessment. By their nature, the precise distribution and characteristics of windfall development will not be known prior to the adoption of the RLDP. However, including policy wording that requires developers to provide the necessary evidence of functional linkage (or absence thereof), sets up an adequate mechanism for ensuring that the integrity of the Severn Estuary SPA / Ramsar is safeguarded.

In-Combination Assessment

6.73 The magnitude of functionally linked habitat loss associated with the Vale of Glamorgan RLDP could be exacerbated by development allocated in other authorities adjoining the Severn Estuary SPA / Ramsar. There is increasing pressure from development on greenfield sites with supporting foraging / roosting function adjoining the estuary. However, the preceding sections highlight that adverse effects could arise from the Vale of Glamorgan RLDP 'alone' and the policy wording recommended above would entirely mitigate potential impacts from the RLDP. Similar protective policy mechanisms will be required for other strategic development plans with the potential to affect habitats that are functionally linked to the Severn Estuary SPA / Ramsar. Overall, provided that the above policy wording is included in the Deposit RLDP, it will not result in the loss of functionally linked habitat in-combination with other plans and projects.

Visual and Noise Disturbance (During Construction)

Severn Estuary SPA / Ramsar

6.74 The Severn Estuary SPA / Ramsar is designated for several waterfowl and wader species that are sensitive to visual and noise disturbance. LSEs of the Vale of Glamorgan RLDP could not be excluded at the screening stage of HRA. Disturbance may result from both visual and aural stimuli, although it is well recognised that there is a paucity of response data particularly in relation to avifaunal responses to construction noise. For the noisiest types of construction activities (e.g. piling, which generates approx. 120dB at source) and considering an acceptable noise level of 70dB at birds, it is generally assumed that non-disturbing sound levels will be reached by about 100m, and certainly by 200m. This is based on field observations of behavioural responses to noise disturbance events, adopting a standard distance decay rate for noise across open areas. However, both the source of noise and bird species involved are important considerations in identifying potential noise disturbance impacts. For example, sudden irregular noise events may evoke bird responses at lower sound levels (approx. 60dB) than more prolonged noise events. Table 9 presents data on the sensitivity of qualifying SPA / Ramsar species to visual and noise disturbance stimuli. It also provides an overall summary of disturbance sensitivity for each of the species.

Table 9: Assessment of qualifying species in the Severn Estuary SPA / Ramsar[106] to visual and noise disturbance stimuli.

Qualifying Species	Sensitivity to Visual Stimuli	Sensitivity to Aural Stimuli	Overall Likelihood of Disturbance
Bewick's swan[107]	Large waterfowl species are highly sensitive to visual stimuli, with minimum approach distance no less than 100m. Sensitivity increases when roosting or loafing, with first behavioural reactions shown at approx. 200m distance.	High sensitivity to noise stimuli, particularly overflying aircraft. Generally, assuming that waterfowl tolerate the visual presence of workers up to approx. 100m, this would require construction works of between 110-115dB at source to result in noise disturbance.	Overall sensitivity rating: High
White-fronted goose	Large waterfowl species are highly sensitive to visual stimuli, with minimum approach distance no less than 100m. Sensitivity increases when roosting or loafing, with first behavioural reactions shown at approx. 200m distance.	High sensitivity to noise stimuli, particularly overflying aircraft. Generally, assuming that waterfowl tolerate the visual presence of workers up to approx. 100m, this would require construction works of between 110-115dB at source to result in noise disturbance.	Overall sensitivity rating: High
Dunlin	Displays behavioural responses to stimuli at 150m distance (during foraging), increasing to 300m for roost sites (mass flight)	Moderate sensitivity to noise disturbance, moving away from sources of high disturbance. Some birds may react to individual construction events (e.g. moving trucks), with others foraging within 20m of works following habituation.	Overall sensitivity rating: Low
Redshank	Relatively tolerant species to visual stimuli, allowing people / workers to approach within 70-115m before flushing.	High sensitivity to noise disturbance, so caution should be applied when exposing birds to noise above 55dB	Overall sensitivity rating: High
Shelduck	High sensitivity to visual disturbance with individuals not approaching construction works to more than 300m. Visual disturbance impacts from individual sources up to 500m away from source.	Reactions to sudden noise above 60dB and any noise above 70dB in about 30% of all exposure events.	Overall sensitivity rating: High
Gadwall	Flight initiation distances (FID) to visual stimuli from pedestrians along the	FIDs to motorised (motorboat) and non-motorised watercraft	Overall sensitivity rating:

[106] The visual and noise disturbance sensitivity assessment presented here focuses on individual qualifying species rather than component species of the qualifying overwintering waterbird assemblage.
[107] No visual and noise disturbance data are available for Bewick's swan and white-fronted goose. Therefore, IECS disturbance data on Brent goose is summarised here as a proxy for larger waterfowl.

	shoreline were between 50-60m.	reported to be 65m and 64.5m respectively. A buffer zone of 200m surrounding commercial vehicle / machine construction activities has been recommended.	Medium
Wigeon	Alert distances (ADs) to visual stimuli from pedestrians along the shoreline were between 30-125m. Median FID for the presence of pedestrians was 75.5m.	FID to motorised watercraft was 250m in nearshore waters off Denmark. A buffer zone of 200m surrounding commercial vehicle / machine construction activities has been recommended.	Overall sensitivity rating: High

6.75 Generally, visual stimuli will typically result in a measurable disturbance effect before associated noise begins to have an impact. For example, Cutts et al. (2013) report that most species will show a flight response when approached to within 100-150m in intertidal sand- or mudflats. Generally, disturbance associated with visual stimuli will be highest where workers operate outside of equipment, large plant is involved, and works are undertaken at high speeds and close to birds. Behavioural responses to visual stimuli are not necessarily straightforward to predict due to a range of confounding factors, such as conspicuousness, visibility conditions and degree of habituation. For example, a lone worker in open habitat may trigger a major flight response at further distances than the operation of large plant. However, despite inter-specific variation, it is now commonly accepted that there are likely to be minimal visual disturbance impacts beyond a 300m distance away from the source.

6.76 Most bird species show a degree of habituation to disturbance stimuli due to repeated exposure in their natural habitats. As a result, some seemingly very high noise levels may cause little to no disturbance in areas with existing loud soundscapes. Using absolute noise thresholds may greatly overestimate the threat that construction noise poses in some areas and place undue burdens on developers. An alternative impact assessment methodology has been developed that compares the absolute change in noise level between the pre-construction and construction phases[108]. This comparison is enabled by undertaking pre-construction baseline noise measurements at receptor locations and contrasting these with noise models informed by construction parameters (e.g. location, type and duration of construction methods). Comparative noise impact assessments provide a valuable alternative and, potentially, more meaningful approach to evaluating construction noise impacts to SPA / Ramsar birds. A comparative approach is likely to be adequate in industrialised south Wales. Generally, the intertidal habitats along the Vale of Glamorgan coastline (and the rest of the Severn Estuary SPA / Ramsar) are situated in a highly developed context and it is considered that the baseline noise and visual disturbance level experienced by qualifying birds is relatively high.

6.77 Overall, it is assumed that a precautionary 300m buffer from the SPA / Ramsar site boundary captures the area within which construction works due to the Vale of Glamorgan RLDP may lead to material visual and noise disturbance to qualifying birds. While the Preferred Strategy RLDP does not allocate any Key Sites within this disturbance buffer zone, further site allocations will be coming forward under the Deposit RLDP. There is also the potential that windfall development, the precise location of which will be unknown in advance, will occur in the wider area around Penarth. To ensure that the qualifying species in the Severn Estuary SPA / Ramsar are protected from disturbance and adequate mitigation measures will be delivered at planning application level, it is recommended that a policy mechanism to this effect is included in the Deposit RLDP.

[108] It is to be noted that this approach to noise impact assessment is now preferred by Natural England for some development projects.

6.78 The following recommendations are made for the Deposit Plan:

- To minimise the potential for visual and noise disturbance, it is recommended that any construction works within 300m of the Severn Estuary SPA / Ramsar are undertaken in the summer months, when qualifying populations in the site will not be present.
- If construction works cannot be timed to avoid the non-breeding season (i.e. passage and winter periods), noise impact assessments will need to be undertaken to ensure that noise levels at sensitive receptors will remain non-disturbing. HRAs accompanying relevant planning applications would need to demonstrate this by either (a) using an absolute threshold of 69dB or (b) comparing construction noise levels to the pre-development baseline. Where construction-phase noise levels are shown to be disturbing, mitigation measures (e.g. noise screens, selection of less noisy construction techniques, damping / noise shielding of equipment, avoidance of lighting) are likely to be required.
- Construction works within 300m of any established high-tide roosts or key foraging areas within our outside the SPA / Ramsar should have appropriate screening in place to minimise visual disturbance.

6.79 Given the length of this recommendation, it is advised that this wording is included within the supporting text of a relevant policy in the RLDP, such as a bespoke policy dealing with the protection of European sites. Alternatively, the above recommendations could be condensed and included in the policy text itself. Noting that the RLDP currently does not allocate any sites within 300m of the Severn Estuary SPA / Ramsar, this policy text would ensure that the site is protected against disturbance impacts from any windfall development. Provided this policy recommendation is incorporated in the Deposit RLDP, there would be no adverse effects on the Severn Estuary SPA / Ramsar regarding visual and noise disturbance from construction.

In-Combination Assessment

6.80 The magnitude of visual and noise disturbance associated with the Vale of Glamorgan RLDP could be exacerbated by development allocated in other authorities adjoining the Severn Estuary SPA / Ramsar. For example, multiple construction projects across several authorities adjoining the Severn Estuary SPA / Ramsar would have the potential to render considerable stretches of designated intertidal habitats and functionally linked habitats temporarily unsuitable for SPA / Ramsar birds. However, the preceding sections set out policy recommendations that will adequately mitigate potential adverse effects of the Vale of Glamorgan RLDP regarding visual and noise disturbance. Similar protective policy mechanisms will be required for other strategic development plans with the potential to result in visual and noise disturbance to the qualifying species in the Severn Estuary SPA / Ramsar. Overall, provided that the above policy wording is included in the Deposit RLDP, it will not result in visual and noise disturbance in-combination with other plans and projects.

Coastal Squeeze

Severn Estuary SAC / SPA / Ramsar

6.81 Climate change is causing rising sea levels, which in turn inundate designated intertidal and terrestrial habitats, including mudflats and saltmarsh (qualifying features of the Severn Estuary SAC and supporting habitats for SPA / Ramsar species). Where urban development is proposed immediately adjoining intertidal habitats, this prevents their landward migration and will result in their loss long-term. Any loss of qualifying and supporting habitat due to coastal squeeze would threaten the Conservation Objectives of relevant European sites and should be prevented.

6.82 Importantly, however, while RLDPs allocate development sites, the strategic approaches towards managing coastal flood and erosion risk along entire sections of coastlines are set out in Shoreline Management Plans (SMPs). Management approaches specified in SMPs include No Active Intervention (NAI; coastal processes are allowed to evolve naturally and, where present, existing defences are permitted to fail), Managed Realignment (MR; hard defences are set back inland to allow nature the space to retreat inland) and Hold the Line (HTL; hard defences along the coastline are constructed / maintained to prevent damage to critical infrastructure). Under

their duty to provide for sustainable development, Local Authorities should not propose housing or employment development in areas that are subject to NAI or MR; in other words locations at high risk of current or future flooding / erosion. Therefore, it is generally expected that RLDPs will be in accordance with management approaches set out in the relevant overarching SMP. While SMPs are non-statutory documents, they are subject to HRA to ensure that their objectives are not in conflict with Conservation Objectives of European sites.

6.83 The Severn Estuary Coastal Group has developed the SMP2, which also covers the eastern coastline of the Vale of Glamorgan between Penarth Head and Lavernock Point along the SAC / SPA / Ramsar. The key policy drivers for this Theme Area are the international nature conservation sites and residential development in Penarth. For Policy Unit PEN1 (Lavernock Point to the shore south of Forest Road), the SMP proposes a preferred policy of NAI across all three epochs to 2105. While some development is present in this policy unit, this is situated on a soft cliff of Triassic mudstone showing evidence of very slow erosion rates. Therefore, it is assumed that the current management practice of allowing the cliff face to evolve naturally can continue into the future.

6.84 In Policy Unit PEN2 (the shore south of Forest Road to Penarth Head), the SMP adopts a policy of HTL across all three epochs. This is due to residential development in Penarth being under limited risk from erosion and flooding due to future sea level rise. The Esplanade and Pier are under threat from wave overtopping. However, the SMP also states that '*where there are currently no defences, HTL is not intended to enable new defences to be built. Other ways of helping businesses and residents cope with any overtopping due to sea level rise should also be investigated.*' By its nature, HTL will inevitably lead to the loss of intertidal habitats where these are impacted by coastal squeeze. Regarding the topic of nature conservation, the SMP specifies that '*works should take account of possible environmental impacts and the need for an EIA. HTL should allow natural processes to dominate in undefended areas, protecting the integrity of the Penarth Coast SSSI and allowing habitats to roll back so intertidal habitats and features will be maintained. Hard geology and existing developments will restrict the amount of roll back.*' Therefore, clearly HTL will not be implemented along the entire frontage of PEN2, but will be complemented by sections of MR.

6.85 The Vale of Glamorgan coastline within Policy Unit PEN2 is already highly developed, with housing directly adjoining the Esplanade. Therefore, it is unlikely that the Vale of Glamorgan RLDP will allocate many developments on greenfield sites adjoining the estuary. Furthermore, as discussed above, the overall management approach of HTL is under the remit of the strategic SMP for the Severn Estuary. Prior to its adoption, the SMP would have undergone HRA to assess whether it would result in adverse effects on the Severn Estuary SAC / SPA / Ramsar regarding coastal squeeze. Any coastal strategies for which adverse effects on intertidal habitats cannot be excluded, the Regional Habitat Compensation Programme (RHCP) is in place to deliver habitat compensation through MR schemes.

6.86 Overall, there will be no adverse effects of the Vale of Glamorgan RLDP on the Severn Estuary SAC / SPA / Ramsar regarding coastal squeeze. This is due to any HTL policy approaches being identified, assessed and compensated for at the SMP level.

In-Combination Assessment

6.87 The potential loss of designated habitat due to coastal squeeze is an impact pathway that inherently involves all authorities adjoining the European site in question. Therefore, intertidal habitat loss is likely to be more significant when considered at the strategic level. However, as discussed in the preceding sections, approaches to coastal management across the estuary are not within the remit of RLDPs, but are identified in overarching SMPs. As highlighted in relation to the Vale of Glamorgan RLDP, the appraisal of adverse effects and potential compensation requirements are undertaken at the strategic SMP level. This will ensure that where in-combination adverse effects regarding coastal squeeze are predicted to occur, adequate compensation will be delivered in all authorities involved.

7. Conclusions & Recommendations

7.1 The HRA of the Vale of Glamorgan Preferred Strategy RLDP examined impacts on the following European sites:

- Severn Estuary SAC / SPA / Ramsar;
- Dunraven Bay SAC;
- Kenfig SAC;
- Cardiff Beech Woods SAC;
- Cefn Cribwr Grasslands SAC; and,
- Blackmill Woodlands SAC.

7.2 The following impact pathways were considered:

- Recreational pressure
- Water quality
- Water quantity, level and flow
- Atmospheric pollution
- Loss of functionally linked habitat
- Noise and visual disturbance; and
- Coastal squeeze.

7.3 For most combinations of European site and impact pathway it was possible to conclude that there would be no likely significant effect, or adverse effect on integrity, either alone or in combination with other projects and plans. The exceptions were the following:

- Recreational pressure at Severn Estuary SPA/SAC/Ramsar site;
- Surface water runoff impacts on Severn Estuary SPA/SAC/Ramsar site;
- Water quality (treated sewage effluent and surface runoff) impacts on Kenfig SAC;
- Loss of functionally-linked habitat associated with Severn Estuary SPA and Ramsar site; and
- Construction-related visual and noise disturbance of Severn Estuary SPA and Ramsar site.

7.4 This conclusion was based on analysis of all policies in the Preferred Strategy RLDP, and its key sites, and cognisance of the fact that additional smaller allocations would be added for the Deposit Plan. The impacts were associated with the following policies:

- Policy SP1 (Growth Strategy) – identifies the broad strategic growth strategy for the Vale of Glamorgan for the period between 2021 and 2036, including the provision of 7,890 dwellings. The geographic locations for growth are also identified.
- Policy SP2 (Settlement Hierarchy) – specifies the settlement hierarchy for the Vale of Glamorgan, including the Key Settlement, Service Centre Settlements and Primary Settlements. This spatial element will contribute to the magnitude of several linking impact pathways.

- Policy SP3 (Housing Requirement) – reaffirms that a total of 7,890 dwellings will be delivered over the RLDP period, but that a portion of this growth will be delivered through an existing landbank of sites.
- Policy SP4 (Key Housing-Led Sites) – lists the Key Sites allocated for delivering the RLDP's housing requirements (in Barry, Dinas Powys, Rhoose and St Athan), totalling a quantum of between 2,450 and 2,750 dwellings.
- Policy SP4 KS1 (North-East Barry) – allocates up to 1,500 dwellings (900 of which will be delivered within the RLDP period), community facilities and green infrastructure in North-East Barry.
- Policy SP4 KS2 (Land to the North of Dinas Powys, Off Cardiff Road) – allocates up to 250 dwellings, recreation spaces and green infrastructure on land to the North of Dinas Powys.
- Policy SP4 KS3 (Readers Way, Rhoose) – allocates up to 450 dwellings, recreation spaces and green infrastructure at Readers Way, Rhoose.
- Policy SP4 KS4 (Church Farm, St Athan) – allocates between 250 and 550 dwellings, recreation spaces and green infrastructure at Church Farm, St Athan.
- Policy SP4 KS5 (Land to the West of St Athan) – allocates a residential-led development of up to 600 dwellings, recreation spaces and green infrastructure on Land to the West of St Athan).
- Policy SP9 (Gypsy and Travellers) – identifies that provision will be made for 11 residential pitches for gypsies and travellers as identified in the latest Gypsy and Traveller Accommodation Assessment (representing a contribution to the overall 'housing' growth).
- Policy SP14 (Sustainable Tourism) – provides general support for tourism in the Vale of Glamorgan, including new low-impact proposals, protection of existing attractions and enhancement of the visitor economy. This will effectively temporarily increase the local population and could lead to increased pressure on European sites.

7.5 To address the potential adverse effects on integrity the following recommendations were made:

Recreational pressure at Severn Estuary

7.6 For the Deposit RLDP, engage with Natural Resources Wales and the Vale of Glamorgan Council ecologist over the need in delivering mitigation for recreational pressure arising from the RLDP. A series of mitigation interventions have been identified, which are being introduced elsewhere around the SAC/SPA/Ramsar site, including:

- Delivery of Suitable Alternative Greenspaces (SANGs) or smaller scale recreational greenspaces, where possible in close proximity to emerging housing sites (although it is noted that it will be difficult to replicate the feel and attractiveness of the estuary);
- On-site Strategic Access Management and Monitoring (SAMM) measures around key themes of wardening, signage, information boards, education and awareness, zoning and bylaws, and parking provision;
- Collaboration with key stakeholders (e.g. Natural Resources Wales, adjoining authorities and Parish councils) to achieve a coordinated, integrated, sustainable and long-term outcome; and
- Future monitoring of recreation levels to assess changing recreation patterns and abundances / distributions of overwintering birds to assess the effectiveness of mitigation measures.

7.7 Rather than delivering a Vale of Glamorgan-specific mitigation solution, an alternative approach would be collaboration with other authorities in the core recreational catchment of the Severn Estuary SAC / SPA / Ramsar. For example, Vale of Glamorgan Council (and other authorities,

such as Cardiff City Council and Monmouthshire County Council) could become signatories to the existing Interim Impact Avoidance Strategy that was developed for Stroud District in England, which would become formalised and expanded geographically to cover the estuarine coastline in other affected Local Planning Authorities.

Surface water runoff impacts on Severn Estuary and Kenfig SAC

7.8 It is acknowledged that Policy SP19 already contains important wording related to SUDS. The final set of allocations will need evaluating within the context of this policy at the Deposit stage.

Treated sewage effluent impacts on Kenfig SAC

7.9 At the time of writing, adverse effects of the Vale of Glamorgan RLDP on the Kenfig SAC regarding water quality cannot be excluded. This is due to uncertainties over the area served by Pen-Y-Bont Merthyr Mawr WwTW (a WwTW in close proximity to the SAC)[eeeee] and the final suite of allocations that will be taken forward in the Deposit RLDP. Therefore, this impact pathway will need to be revisited in the Deposit Plan HRA, when the required evidence base will be available.

Functionally linked land impacts on Severn Estuary SPA/Ramsar

7.10 To minimise the potential for the emerging RLDP to result in the loss of functionally linked habitat, it is recommended that the following text (or similar) is inserted to an appropriate policy of the Deposit Plan: 'To meet the requirements of the Conservation of Habitats and Species Regulations 2017 (as amended), the applicant is required to provide evidence that development will not result in adverse effects on the integrity of the Severn Estuary SPA / Ramsar regarding the loss of functionally linked habitat. To demonstrate this, a survey of the habitats on site is required. Where habitats are suitable, non-breeding bird surveys to determine whether the site constitutes functionally linked habitat (defined as supporting close to or above 1% of the any qualifying population) must be undertaken. These will need to cover autumn, winter and spring to capture the core overwintering as well as any passage periods. If habitat within the site is identified to support significant populations of designated bird species, avoidance measures and mitigation will be required, and the planning application will likely need to be assessed through a project-specific Habitats Regulations Assessment.'

Construction-related visual and noise disturbance on Severn Estuary SPA/Ramsar site

7.11 The following recommendations are made for the Deposit Plan:

- To minimise the potential for visual and noise disturbance, it is recommended that any construction works within 300m of the Severn Estuary SPA / Ramsar are undertaken in the summer months, when qualifying populations in the site will not be present.
- If construction works cannot be timed to avoid the non-breeding season (i.e. passage and winter periods), noise impact assessments will need to be undertaken to ensure that noise levels at sensitive receptors will remain non-disturbing. HRAs accompanying relevant planning applications would need to demonstrate this by either (a) using an absolute threshold of 69dB or (b) comparing construction noise levels to the pre-development baseline. Where construction-phase noise levels are shown to be disturbing, mitigation measures (e.g. noise screens, selection of less noisy construction techniques, damping / noise shielding of equipment, avoidance of lighting) are likely to be required.

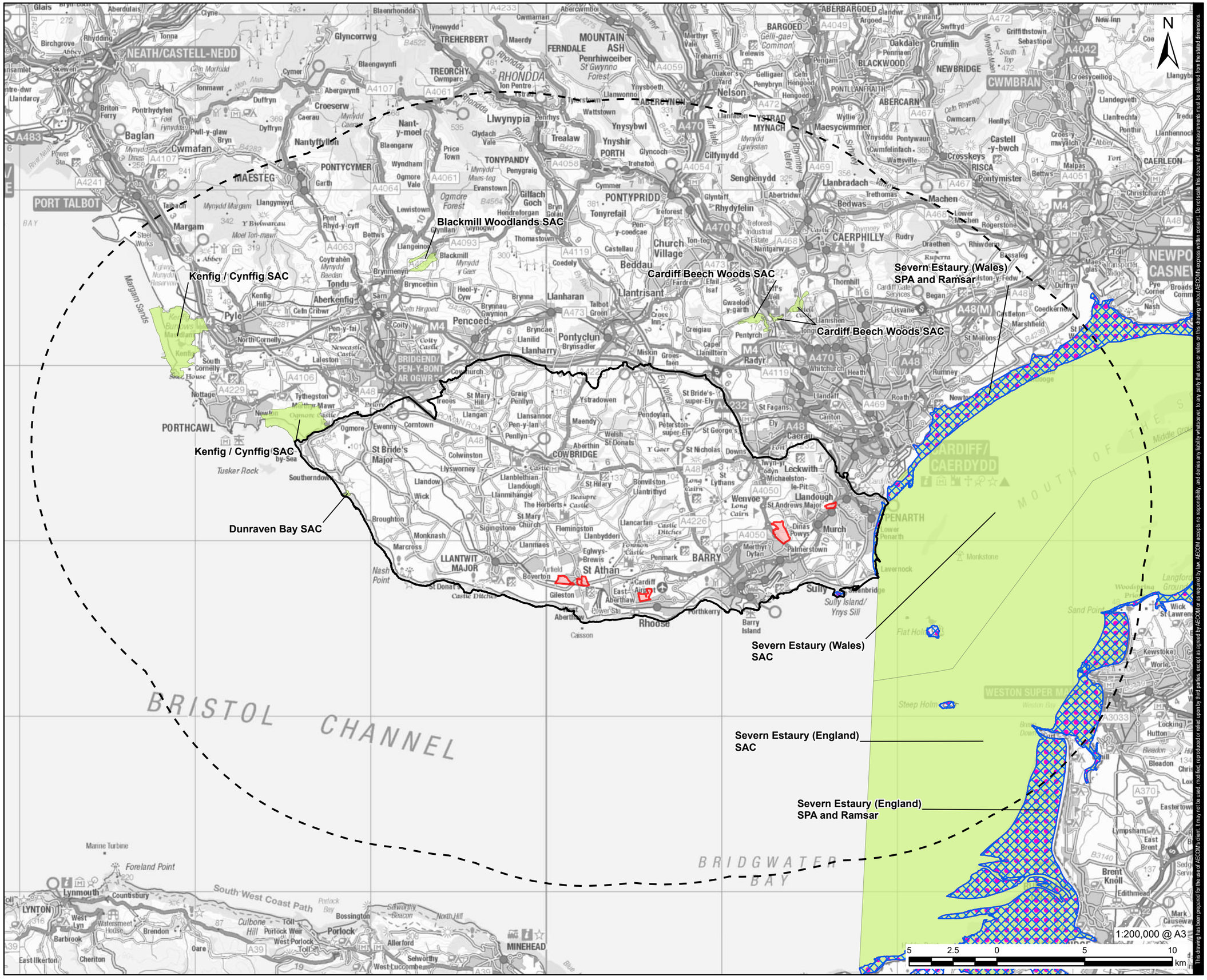
[eeeee] AECOM is in the process of liaising with Welsh Water to confirm whether this WwTW serves development in the Vale of Glamorgan.

- Construction works within 300m of any established high-tide roosts or key foraging areas within our outside the SPA / Ramsar should have appropriate screening in place to minimise visual disturbance.

7.12 Given the length of this recommendation, it is advised that this wording is included within the supporting text of a relevant policy in the RLDP, such as a bespoke policy dealing with the protection of European sites. Alternatively, the above recommendations could be condensed and included in the policy text itself. Noting that the RLDP currently does not allocate any sites within 300m of the Severn Estuary SPA / Ramsar, this policy text would ensure that the site is protected against disturbance impacts from any windfall development. Provided this policy recommendation is incorporated in the Deposit RLDP, there would be no adverse effects on the Severn Estuary SPA / Ramsar regarding visual and noise disturbance from construction.

Appendix A Maps

Figure 4: Key Sites allocated in the Vale of Glamorgan RLDP Preferred Strategy and European sites within 15km of the Vale of Glamorgan authority boundary.



AECOM

PROJECT

Habitats Regulations Assessment of the Vale of Glamorgan RLDP Preferred Strategy

CLIENT

Vale of Glamorgan Council

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LEGEND

- Vale of Glamorgan Authority Boundary
- 15km Study Area
- Key Candidate Site
- Special Protection Area (SPA)
- Ramsar
- Special Area of Conservation (SAC)

NOTES

ISSUE PURPOSE

FINAL

PROJECT NUMBER

60676814

FIGURE TITLE

Allocated Key Sites and European sites within 15km of the Vale of Glamorgan Authority Boundary

FIGURE NUMBER

Appendix A - Figure 4

Appendix B Screening for Likely Significant Effects (LSEs)

Table 10: Likely Significant Effects (LSEs) screening[110] of policies contained in the Vale of Glamorgan Replacement Local Development Plan (RLDP) Preferred Strategy.

Policy Number / Name	Policy Summary	Likely Significant Effects Screening Outcome
Policy SP1: Growth Strategy	The Vale of Glamorgan RLDP will make provision for the following in the period 2021-2036: **Housing** The delivery of 7,890 dwellings by 2036, including a minimum of 2,000 affordable homes. The primary focus of housing and employment growth within the Vale shall be within the Strategic Growth Area as identified on the Key Diagram and will be concentrated in the following locations that are served by existing public transport routes and provide the opportunity to enhance sustainable transport connectivity: A. Barry B. Penarth C. Llantwit Major D. Cowbridge E. Dinas Powys F. Rhoose G. St Athan In rural areas, additional growth will be permitted within existing settlement boundaries and on affordable housing led schemes in sustainable locations. **Employment** Employment sites to deliver the identified employment land requirement 67.8ha and the delivery of up to 5,388 jobs. New employment development will be focussed on existing Major and Locally Important Employment Sites. **Infrastructure** Deliver associated infrastructure necessary to support the growth.	Likely Significant Effects (LSEs) of Policy SP1 on European sites cannot be excluded. Policy SP1 sets out the broad growth strategy for the Vale of Glamorgan in the period between 2021 and 2036, which includes the delivery of 7,890 dwellings and 67.8ha of employment land. It also specifies the settlements within which development will be concentrated. As such, the policy sets out quanta and locations of residential and employment development, key parameters in determining the magnitude of potential impact pathways linking to European sites.

[110] Where the Screening Outcome column is shaded green, the policy is concluded not to result in LSEs on any European sites. Where it is shaded orange, LSEs of the policy on European sites cannot be excluded and it is screened in for AA.

			The following impact pathways may be associated with Policy SP1: • Recreational pressure • Atmospheric pollution • Loss of functionally linked habitat • Water quality • Hydrology • Coastal squeeze Overall, due to its impact potential, Policy SP1 is screened in for AA.
Policy SP2: Settlement Hierarchy		The broad distribution of development within the Strategic Growth Area will be shaped by the following hierarchy of settlements, reflecting the role and function of places, and directing growth to locations that will provide the greatest opportunities for delivering housing to meet affordable needs, community infrastructure and enhanced sustainable transport provision. **Strategic Growth Area Settlement Hierarchy:** **Key Settlement: Barry**. Barry will remain the focus of future development within the Vale of Glamorgan. As the largest town within the Vale, future growth will support its role as the main administrative town providing good transport connectivity, services, employment and retail and leisure for its residents and wider area. **Service Centre Settlements: Cowbridge, Llantwit Major, Penarth.** These important settlements that offer a range of facilities that also serve a wider area growth will support this role and a where the level of development will meet local needs of the area. **Primary Settlements: Rhoose, St Athan, Sully, Llandough, Dinas Powys** Development within these settlements will reflect the complimentary role they have in relation to the Key and Service Centre Settlements, transport connectivity and areas of employment. **Areas Outside the Strategic Growth Area** **Primary Settlements:** Wenvoe, Wick, Culverhouse Cross	Likely Significant Effects (LSEs) of Policy SP2 on European sites cannot be excluded. Policy SP2 specifies the settlement hierarchy to be adopted for the Vale of Glamorgan. It identifies that the focus of development will be in Barry (Key Settlement), Cowbridge,Llantwit Major, Penarth (all Service Centre Settlements), Rhoose, St Athan, Sully, Llandough and Dinas Powys (all Primary Settlements). While no growth quanta are provided, the distribution of growth plays a key role in determining impact pathways, such as by shaping broad recreation patterns, preferred commuter routes and strategic water distribution.

	Minor Rural Settlements: Ewenny, Corntown, St Brides Major, Colwinston, St Nicholas, Bonvilston, Fferm Goch, Peterston Super Ely, Llandow, Ystradowen, Llanmaes, Pendoylan, Aberthin, Llancarfan, Llysworney, Graig Penllyn, Ogmore by Sea, Sigingstone, Aberthaw East, Penllyn, Treoes. The character of the settlements, including their relationship to and setting within the surrounding countryside, will be protected and where possible enhanced. Development in the Primary Settlements that are outside of the strategic growth area as well as the Minor Rural Settlements identified will be limited to the efficient and sustainable use of existing buildings, infill opportunities, small-scale affordable housing led schemes, and rural enterprise/ agricultural related developments. For the purposes of this policy small scale affordable housing led developments are defined as providing a minimum of 50% affordable housing on sites of up to 25 dwellings in minor rural settlements or up to 50 dwellings in primary settlements. The type, scale and mix of affordable housing will be expected to reflect the latest evidence, including specialist older person housing. Proposals which do not meet the minimum 50% affordable housing provision will not be supported. The settlements identified within the settlement hierarchy have been afforded settlement boundaries. Outside of these defined settlement boundaries are regarded as 'countryside' unless specifically identified for other uses in the plan.	The following impact pathways may be associated with Policy SP2: • Recreational pressure • Atmospheric pollution • Loss of functionally linked habitat • Water quality • Hydrology • Coastal squeeze Overall, due to its impact potential, Policy SP2 is screened in for AA.
Policy SP3: Housing Requirements	To meet the identified housing requirement of 7,890 dwellings, provision will be made for the delivery of 8,679 homes in the Plan Period 2021 to 2036. This will be delivered by: • 4,457 dwellings from the existing land supply • 1,603 dwellings from large and small windfall developments • 2,450 to 2,750 dwellings on key sites* • Additional new housing allocations including affordable led developments* *Exact numbers of units to be determined at Deposit RLDP stage	Likely Significant Effects (LSEs) of Policy SP3 on European sites cannot be excluded. Policy SP3 stipulates the housing requirement of 7,890 dwellings in the Plan period of 2021 to 2036, which was already identified in Policy SP1. Furthermore, it specifies that 4,457 dwellings will be delivered from an existing land supply (already consented). Together with the Key Sites allocations, this housing target provides a quantum and geographic location of population growth, which will be influential in

		determining potential impacts to European sites. The following impact pathways may be associated with Policy SP3: • Recreational pressure • Atmospheric pollution • Loss of functionally linked habitat • Water quality • Hydrology • Coastal squeeze Overall, due to its impact potential, Policy SP3 is screened in for AA.
Policy SP4: Key Housing-Led Sites	To deliver the plan's strategic growth and contribute to meeting the identified housing requirement set out in SP3, additional land is identified for residential development within the following key locations: **Key Sites** **Site Reference** / **Settlement** / **Site Name** / **Dwellings proposed in plan period** SP4 KS1 / Barry / North East Barry / 900 SP4 KS2 / Dinas Powys / North of Dinas Powys, off Cardiff Road / 250 SP4 KS3 / Rhoose / Readers Way / 450 SP4 KS4 / St Athan / Church Farm, St Athan / 250-550 SP4 KS5 / St Athan / Land to the West of St Athan / 600 2,450 - 600	Likely Significant Effects (LSEs) of Policy SP4 on European sites cannot be excluded. Policy SP4 specifies the Key Sites within which additional residential dwellings will be delivered to meet the RLDP's growth targets, including in Barry, Dinas Powys, Rhoose and St Athan (a total of between 2,450 and 2,750 dwellings). Furthermore, a list of Strategic Growth Area Land Bank Sites is provided, all of which have residual dwellings remaining. Therefore, the land bank sites do not require further assessment. Overall, this policy specifies a quantum and geographic location of population growth, which will be

Strategic Growth Area Land Bank Sites - Committed and Rolled Forward Housing Sites				
Reference	**Settlement**	**Site Name**	**Status**	**Dwellings Remaining 1st April 2023**
SP4 L1	Barry	Land West of Pencoedtre Lane	Rolled forward Adopted LDP allocation	135
SP4 L2	Cowbridge	Land adjoining St. Athan Road	Planning application awaiting determination	105
SP4 L3	Cowbridge	Darren Farm	Under Construction	306
SP4 L4	Llantwit Major	Former Eagleswell School	Rolled forward Adopted LDP allocation	72
SP4 L5	Llantwit Major	Land between new Northern Access Road and Eglwys Brewis Road (east)	Rolled forward Adopted LDP allocation	185
SP4 L6	Llantwit Major	Land adjacent to Froglands Farm	Planning permission (subject to s106)	90
SP4 L7	Llantwit Major	Land between the Northern Access Road and Eglwys Brewis Road (west)	Planning permission (subject to s106)	140

influential in determining potential impacts to European sites.

The following impact pathways may be associated with Policy SP4:

- Recreational pressure
- Atmospheric pollution
- Loss of functionally linked habitat
- Water quality
- Hydrology
- Coastal squeeze

Overall, due to its impact potential, Policy SP4 is screened in for AA.

SP4 L8	Penarth	Land at Upper Cosmeston Farm	Planning application awaiting determination	576
SP4 L9	Penarth	Land south of Llandough Hill / Penarth Road	Planning permission (subject to s106)	133
SP4 L10	Rhoose	Land north of the Railway Line, (East)	Planning application awaiting determination	282
SP4 L11	St Athan	Land at Burley Place	Rolled forward Adopted LDP allocation	80
SP4 L12	St Athan	Land to the east of Eglwys Brewis	Under construction	152
SP4 L13	Sully	Land at Swanbridge Road	Under construction	333
			Total	2589

In delivering the housing requirement, all new residential developments will be required to contribute towards the provision of an appropriate mix of market housing, affordable housing, specialist accommodation and support the transition to zero carbon.

Policy SP4 KS1: North-East Barry	Land in North East Barry is allocated for a residential led development comprising residential, community facilities including a primary school, commercial uses, green infrastructure and leisure facilities and improved active travel routes. The site will accommodate up to 1,500 dwellings, of which 900 dwellings would be delivered during the Plan period. The developer will be required to provide the following: • A minimum of 30% of affordable housing, subject to consideration of viability.	Likely Significant Effects (LSEs) of Policy SP4 KS1 on European sites cannot be excluded. Policy SP4 KS1 identifies that up to 1,500 dwellings (900 dwellings of which during the RLDP period) will be delivered on land in North-East

	• On and off-site measures to provide good quality, attractive, legible, safe and accessible pedestrian and cycle linkages to local services, facilities and public transport nodes, including to Cadoxton Station. • The delivery of a village centre encompassing an appropriate mix of uses to be determined through the Masterplanning process. • The on-site provision of education facilities. • Improvements to infrastructure, including the upgrading of highways, pedestrian and cycle access from Gilbert Lane and Argae Lane. • The provision and enhancement of appropriate green infrastructure, leisure, sport and recreation space together with biodiversity enhancement to achieve biodiversity net benefit. • Other planning obligations as necessary in accordance with Policy SP12 to be determined through the Masterplanning process.	Barry. The residential-led development will also comprise a range of community facilities, including a primary school, green infrastructure and leisure facilities. Residential growth in Barry will be associated with increased demand for recreational spaces, potable water and commuter journeys. These aspects are likely to partly determine potential impacts to European sites. The following impact pathways may be associated with Policy SP4 KS1: • Recreational pressure • Atmospheric pollution • Loss of functionally linked habitat • Water quality • Hydrology • Coastal squeeze Overall, due to its impact potential, Policy SP4 KS1 is screened in for AA.
Policy SP4 KS2: Land to the North of Dinas Powys, Off Cardiff Road	Land to the North of Dinas Powys is allocated for a comprehensive residential led development of 250 homes during the Plan period. The developer will be required to provide the following: • A minimum of 40% of affordable housing, subject to consideration of viability. • On and off-site measures to provide good quality, attractive, legible, safe and accessible pedestrian and cycle linkages to local services, facilities and public transport nodes, including Eastbrook Station.	Likely Significant Effects (LSEs) of Policy SP4 KS2 on European sites cannot be excluded. Policy SP4 KS2 identifies that up to 250 dwellings will be delivered on land to the North of Dinas Powys off Cardiff Road.

	• Improvements to infrastructure, including the upgrading of highways, pedestrian and cycle access on to Cardiff Road. • The provision and enhancement of appropriate green infrastructure, leisure, sport and recreation space together with biodiversity enhancement to achieve biodiversity net benefit. • Other planning obligations as necessary in accordance with Policy SP12 to be determined through the Masterplanning process.	Residential growth in this settlement will be associated with increased demand for recreational spaces, potable water and commuter journeys. These aspects are likely to partly determine potential impacts to European sites. The following impact pathways may be associated with Policy SP4 KS2: • Recreational pressure • Atmospheric pollution • Loss of functionally linked habitat • Water quality • Hydrology • Coastal squeeze Overall, due to its impact potential, Policy SP4 KS2 is screened in for AA.
Policy SP4 KS3: Readers Way Rhoose	Land at Readers Way, Rhoose is allocated for a comprehensive, residential led development of 450 homes during the Plan period. A minimum of 35% of all new homes will be required to be affordable. The developer will be required to provide the following: • A minimum of 35% of affordable housing, subject to consideration of viability. • On and off-site measures to provide good quality, attractive, legible, safe and accessible pedestrian and cycle linkages to local services, facilities and public transport nodes, including Rhoose Station. • The delivery of an appropriate mix of uses to be determined through the Masterplanning process. • Improvements to infrastructure, including the upgrading of highways, pedestrian and cycle access to serve the site. • The provision and enhancement of appropriate green infrastructure, leisure, sport and recreation space together with biodiversity enhancement to achieve biodiversity net benefit.	Likely Significant Effects (LSEs) of Policy SP4 KS3 on European sites cannot be excluded. Policy SP4 KS3 identifies that up to 450 dwellings will be delivered at Readers Way Rhoose over the RLDP period. Residential growth in this settlement will be associated with increased demand for recreational spaces, potable water and commuter journeys. These aspects

	• Other planning obligations as necessary in accordance with Policy SP12 to be determined through the Masterplanning process.	are likely to partly determine potential impacts to European sites. The following impact pathways may be associated with Policy SP4 KS3: • Recreational pressure • Atmospheric pollution • Loss of functionally linked habitat • Water quality • Hydrology • Coastal squeeze Overall, due to its impact potential, Policy SP4 KS3 is screened in for AA.
Policy SP4 KS4: Church Farm, St Athan	Land at Church Farm, St Athan is allocated for a comprehensive residential led, development of between 250 and 550 homes during the Plan period. A minimum of 35% of all new homes will be required to be affordable. The developer will be required to provide the following: • A minimum of 35% of affordable housing, subject to consideration of viability. • On and off-site measures to provide good quality, attractive, legible, safe and accessible pedestrian and cycle linkages to local services, facilities and public transport nodes. • The delivery of an appropriate mix of uses to be determined through the Masterplanning process. • Improvements to infrastructure, including the upgrading of highways, pedestrian and cycle access to serve the site. • The provision and enhancement of appropriate green infrastructure, leisure, sport and recreation space together with biodiversity enhancement to achieve biodiversity net benefit. • Other planning obligations as necessary in accordance with Policy SP12 to be determined through the Masterplanning process. This may include a contribution towards the delivery of a new station at St Athan.	Likely Significant Effects (LSEs) of Policy SP4 KS4 on European sites cannot be excluded. Policy SP4 KS4 identifies that between 250 and 550 dwellings will be delivered at Church Farm, Rhoose over the RLDP period. Residential growth in this settlement will be associated with increased demand for recreational spaces, potable water and commuter journeys. These aspects are likely to partly determine potential impacts to European sites.

		The following impact pathways may be associated with Policy SP4 KS4: • Recreational pressure • Atmospheric pollution • Loss of functionally linked habitat • Water quality • Hydrology • Coastal squeeze Overall, due to its impact potential, Policy SP4 KS4 is screened in for AA.
Policy SP4 KS5: Land to the West of St Athan	Land to West of St Athan is allocated for a comprehensive, residential led development of 600 homes during the Plan period. A minimum of 35% of all new homes will be required to be affordable. The developer will be required to provide the following: • A minimum of 35% of affordable housing, subject to consideration of viability. • On and off-site measures to provide good quality, attractive, legible, safe and accessible pedestrian and cycle linkages to local services, facilities and public transport nodes. • The delivery of an appropriate mix of uses to be determined through the Masterplanning process. • Improvements to infrastructure, including the upgrading of highways, pedestrian and cycle access to serve the site. • The provision and enhancement of appropriate green infrastructure, leisure, sport and recreation space together with biodiversity enhancement to achieve biodiversity net benefit. • Other planning obligations as necessary in accordance with Policy SP12 to be determined through the Masterplanning process. This may include a contribution towards the delivery of a new station at St Athan.	Policy SP4 KS5 identifies that a residential-led development of up to 600 dwellings will be delivered on Land to the West of St Athan over the RLDP period. Residential growth in this settlement will be associated with increased demand for recreational spaces, potable water and commuter journeys. These aspects are likely to partly determine potential impacts to European sites. The following impact pathways may be associated with Policy SP4 KS5: • Recreational pressure • Atmospheric pollution • Loss of functionally linked habitat

		• Water quality • Hydrology • Coastal squeeze Overall, due to its impact potential, Policy SP4 KS5 is screened in for AA.
Policy SP5: Placemaking	Development proposals will be required to demonstrate the following Placemaking Principles which will add social, economic, environmental, and cultural value, resulting in enhanced local benefits by: A. Ensuring high quality sustainable design that reflects local distinctiveness, character, and cultural identity; B. Prioritising the determinants of health and well-being during the design process; C. Creating a diverse mix of uses and multi-functional spaces; D. Contributing to a vibrant, safe and inclusive public realm that encourages active travel and reduces car dependency; E. Strategically integrating Green Infrastructure networks and open space into development, delivering social and environmental benefits; F. Providing a range of housing types and tenure; G. Locating development appropriately where homes, local services and facilities are accessible and well connected; H. Developing high densities where appropriate, making the most efficient use of land and supporting mixed uses; I. Protecting and enhancing the Historic Environment. Placemaking Statements will be required for all major developments setting out how the proposal accords with Placemaking Principles.	There will be no LSEs of Policy SP5 on European sites. This is a development management policy that requires all development proposals to abide by Placemaking Principles, pertaining high-quality sustainable design, health and well-being, green infrastructure, development density and other factors. No quanta or locations of residential / employment development are set out. Overall, therefore, Policy SP5 is screened out from AA.
Policy SP6: Creating Healthy and Inclusive Places and Spaces	All development shall seek to create healthy and inclusive places that improve health inequities and social cohesion. This will be achieved by: A. Ensuring development proposals are designed to facilitate accessible healthy environments to address relevant determinants of health positively, particularly in response to local health needs. B. Ensuring that all places and developments are as inclusive as possible, capable of adapting to a broad range of changing needs and delivering a high quality of life, where no one is excluded. C. Enabling Opportunities for access to healthy food choices D. Supporting the provision of new and enhanced community and healthcare facilities.	There will be no LSEs of Policy SP6 on European sites. This is a development management policy that promotes the creation of healthy and inclusive environments, such as through the delivery of healthy food

	E. Protecting existing public health and well-being. Major Developments will be required to be accompanied by Health Impact Assessments to fully consider their health implications.	choices and enhanced community / healthcare facilities. No quanta or locations of residential / employment development are set out. Overall, therefore, Policy SP6 is screened out from AA.
Policy SP7: Sustainable Transport	To help address the RLDP Vision and Objectives, the Plan encourages a modal shift towards sustainable forms of transport and increasing active travel opportunities. New development must support an enhanced transport network that increases the proportion of journeys being undertaken by sustainable travel modes. This will be achieved through: A. i. Appropriately siting new developments in sustainable and accessible locations where a range of services and facilities are within walking and cycling distance. ii. Ensuring that new development is integrated with existing Active Travel Routes that provide a safe, inclusive, pleasant travelling experience, contributes to their expansion and improves connectivity within and between towns, villages and surrounding rural settlements. iii. Ensuring that new developments are designed to encourage walking, cycling and public transport use as alternatives to private car use iv. Adopting appropriate levels of car and bicycle parking provision, reflecting the plans objectives for reducing car borne journeys in accordance with the Council's adopted parking standards v. Improving accessibility and connectivity to sustainable transport facilities. vi. Providing new or enhanced transport services and facilities where appropriate. vii. Supporting and facilitating the delivery of the South Wales Metro. viii. Safeguarding former railway lines for potential and existing Active Travel routes. ix. Providing the necessary infrastructure for ULEVs in appropriate locations. B. As appropriate, new development proposals will be required to provide Transport Statements, Transport Assessments and Travel Plans to ensure the delivery of travel choice and sustainable opportunities for travel C. New developments anticipated to have an adverse impact on the transport network will be expected to contribute towards capacity and mitigation measures. Proposals that require new transport infrastructure will be required to make a proportionate financial contribution.	There will be no LSEs of Policy SP7 on European sites. This is a development management policy that encourages a modal shift towards sustainable forms of transport and active travel opportunities. For example, new developments will be required to provide Transport Statements, Transport Assessments and Travel Plans. Effectively, this is a positive policy for European sites that are sensitive to atmospheric pollution, as it aims at reducing the volume of car-based commuter traffic, which will include any traffic flowing within 200m of sensitive habitat receptors. No quanta or locations of residential / employment development are set out. Overall, therefore, Policy SP7 is screened out from AA.

Policy SP8: Affordable and Specialist Housing	The residential requirement identified in Strategic Policy 3 will be expected to contribute to the established community housing needs of the Vale of Glamorgan by delivering a minimum of 2,000 affordable residential units over the plan period. In meeting this target, the plan will ensure that new housing developments provide for a mix of housing tenures, types, and sizes of homes, including specialist accommodation to meet the needs for residents with care needs and an ageing population, in accordance with the Council's latest Local Housing Marking Assessment and Older Persons Housing Strategy.	There will be no LSEs of Policy SP8 on European sites. This is a development management policy that relates to the provision of affordable and specialist housing, including a minimum of 2,000 affordable dwellings. While the policy relates to housing provision, no quanta or locations of residential / employment development are set out (this is done in Policy SP3). Overall, therefore, Policy SP8 is screened out from AA.
Policy SP9: Gypsy and Travellers	Land will be made available to accommodate unmet Gypsy and Traveller accommodation identified in the latest Gypsy and Traveller Accommodation Assessment for the provision of 11 residential pitches by 2036.	Likely Significant Effects (LSEs) of Policy SP9 on European sites cannot be excluded. Policy SP9 identifies that provision will be made for 11 residential pitches for gypsies and travellers as identified in the latest Gypsy and Traveller Accommodation Assessment, effectively representing a contribution to the overall housing growth within the authority. This pitch provision will be influential in determining potential impacts to European sites.

		The following impact pathways may be associated with Policy SP9: • Recreational pressure • Atmospheric pollution • Loss of functionally linked habitat • Water quality • Hydrology • Coastal squeeze Overall, due to its impact potential, Policy SP9 is screened in for AA.
Policy SP10: Retail, Commercial and Service Centres	The Hierarchy of Retail, Commercial and Service Centres within the Vale of Glamorgan is as follows: **Town Centres -** Barry Holton Road, Penarth, Cowbridge Town centres provides (or have the potential to provide) a range of shops, services, businesses, cultural, leisure and community facilities to a significant hinterland which includes smaller neighbouring towns or a number of suburbs. **District Centres** - Barry High Street, Llantwit Major District centres provide (or have the potential to provide) a range of shops, services, businesses and community facilities to a hinterland which includes neighbouring villages or a few surrounding suburbs. **Village and Local Centres -** Barry: Main Street, Cadoxton; Vere Street, Cadoxton; Park Crescent; Barry Road, nr. Cadoxton; Upper Holton Road Dinas Powys: Cardiff Road; Dinas Powys Village Centre Penarth: Cornerswell Road Rhoose: Fontygary Road St Athan: The Square Village and Local Centres provides (or have the potential to provide) essential shops and services to a surrounding community including nearby villages and hamlets. **Neighbourhood Centres -** Barry: Bron-y-Mor; Cwm Talwg; Gibbonsdown Centre; Park Road Boverton Dinas Powys: Camms Corner; Castle Court/The Parade Llantwit Major: Crawshay Drive	Likely Significant Effects (LSEs) of Policy SP10 on European sites cannot be excluded. Policy SP10 specifies the hierarchy of retail, commercial and service centres within the Vale of Glamorgan. According to the policy, the defined centres will be the preferred locations for delivery of retail, leisure, office, visitor accommodation and community facility uses. While no growth quanta are provided, the distribution of employment growth plays a key role in determining impact pathways, such as by shaping preferred commuter routes and strategic water distribution.

		Penarth: Pill Street; Tennyson Road Neighbourhood Centres provide (or have the potential to provide) essential shops and services to its immediate residential area). The centres identified above are the preferred locations for a range of uses, including retail, leisure, office, visitor accommodation and appropriate residential and community facilities. Development proposals must be in keeping with the defined role of each centre. New development within the Retail, Commercial and Service Centres should accord with the defined role of each centre within the hierarchy and support the vitality and viability and increase footfall within the centres.	The following impact pathways may be associated with Policy SP10: • Atmospheric pollution • Loss of functionally linked habitat • Water quality • Hydrology • Coastal squeeze Overall, due to its impact potential, Policy SP10 is screened in for AA.
Policy SP11: Floorspace	Retail	New retail floorspace should be directed to the town and district centres identified in Policy SP10. There is capacity for between 4,282 and 5,862 sqm (net) of new convenience retail floorspace with the Vale of Glamorgan. Where quantitative and qualitative need has been evidenced and suitable sites are not available within the town and district centres, the sequential test will be followed. Where need is identified, proposals must conform with the requirements of relevant RLDP Policies.	Likely Significant Effects (LSEs) of Policy SP11 on European sites cannot be excluded. Policy SP11 identifies that between 4,282 and 5,862m^2 of employment floorspace will be delivered throughout the Vale of Glamorgan, directed towards the town and district centres as identified in Policy SP10. The geographic distribution of employment floorspace will contribute in shaping traffic flows, water demand and sewage production across the authority. In turn, this will contribute to impact pathways linking to European sites. The following impact pathways may be associated with Policy SP11: • Atmospheric pollution

		• Loss of functionally linked habitat • Water quality • Hydrology • Coastal squeeze Overall, due to its impact potential, Policy SP11 is screened in for AA.
Policy SP12: Community Infrastructure and Planning Obligations	Where appropriate and having regard to development viability, the Council will seek to secure new and improved community infrastructure, facilities, and services appropriate to the scale, type, and location of proposed developments through the use of planning obligations. Community infrastructure may include the provision or improvement of: A. Affordable and specialist housing. B. Educational provision and facilities. C. Transport infrastructure and facilities for pedestrians, cyclists, public transport, and vehicular traffic. D. Public open space. E. Community Growing Spaces such as allotments F. Green infrastructure. G. Public art H. Leisure, sport, and recreational facilities. I. Biodiversity Enhancement. J. Community facilities. K. Healthcare facilities. L. Service and utilities infrastructure, including digital infrastructure. M. Environmental protection and enhancement such as flood prevention, town centre regeneration, pollution management or historic renovation. N. Recycling and waste management facilities; and O. Employment opportunities and complementary facilities including training and working hubs. The delivery of new or improved infrastructure, or other appropriate measures, must be undertaken in a timely and coordinated manner to meet the needs of existing and planned communities prior to, or from the commencement of, the relevant phases of development.	There will be no LSEs of Policy SP12 on European sites. This is a development management policy that supports new and improved community infrastructure, facilities and services where needed. Such infrastructure may relate to biodiversity enhancement and environmental protection. For example, new wastewater treatment infrastructure may be delivered to accommodate the effluent generated by additional housing growth. Overall, it is considered that the delivery of adequate infrastructure is positive for European sites, particularly those that are sensitive to changes in water quality and hydrology. The policy also makes the positive provision of adequate infrastructure being in place prior to the commencement of the relevant phases of development.

		Overall, therefore, Policy SP12 is screened out from AA.
Policy SP13: Employment Growth	To support job growth and economic prosperity across the Vale of Glamorgan over the plan period and to meet the projected employment land needs of 67.8 hectares of employment land, and the delivery of up to 5,338 jobs, provision of 168 net hectares of employment land for B1 (Office and Light Industry), B2 (General Industries) and B8 (Distribution and Storage) employment uses is provided at the following major and local employment locations: **Major Employment Allocations*:** 1. Land east of Cardiff Airport, Rhoose (16.3 ha net) 2. Land south of Port Road (Model Farm), Rhoose (44.75 ha net) 3. Bro Tathan East, Aerospace and Business Park (48.5 ha net) 4. Land to the South of Junction 34, Hensol (29.59 ha net) **Local Employment Allocations:** 5. Atlantic Trading Estate, Barry (6.21 ha net) 6. Windmill Park, Hayes Road, Barry (3.6 ha net) 7. Vale Business Park, Llandow (12.4 ha net) 8. Land to the South of Junction 34 M4 Hensol (Area D 6.64 ha net) **Employment Regeneration Areas:** Proposals for redevelopment and enhancement of existing land and premises for B1, B2 and B8 and Low and Zero Carbon related employment and infrastructure proposals will be supported at: 9. Former Aberthaw Power Station 10. No.2 Port, Barry Docks *Complimentary ancillary non-B uses maybe permissible where these would provide supporting services for existing and future businesses and their employees.	Likely Significant Effects (LSEs) of Policy SP13 on European sites cannot be excluded. Policy SP13 supports a prosperous Vale of Glamorgan by delivering the projected need of 67.8ha of employment land and 5,338 new jobs over the RLDP period. A range of employment allocations are provided, including Major and Local Employment Allocations. Furthermore, two sites are identified for redevelopment and enhancement. By allocating a specific quantum of employment floorspace and providing corresponding locations, Policy SP13 will play a key role in determining employment-related impact pathways, such as by shaping preferred commuter routes and strategic water distribution. The following impact pathways may be associated with Policy SP13: • Atmospheric pollution • Loss of functionally linked habitat • Water quality • Hydrology • Coastal squeeze

		Overall, due to its impact potential, Policy SP13 is screened in for AA.
Policy SP14: Sustainable Tourism	Proposals which promote the Vale of Glamorgan as a destination for Sustainable Tourism will be favoured. Development proposals should contribute to the positive image of the Vale as an attractive and sustainable tourist destination by: A. Promoting opportunities for visitors to engage in forms of tourism that have a low impact on the environment. B. Protecting and enhancing existing tourism attractions and leisure facilities; C. Enhancing the visitor economy, attracting local investment, providing local employment opportunities and contributing to rural diversification. D. Recognising and protecting the Vale's distinct local identity, built and natural environment as assets to tourism; E. Providing a variety of tourism opportunities, particularly through all year-round facilities and a range of appropriately located visitor accommodation.	Likely Significant Effects (LSEs) of Policy SP14 on European sites cannot be excluded. Policy SP14 promotes the Vale of Glamorgan as a desirable destination for sustainable tourism, such as by supporting low-impact proposals, protecting existing tourism attractions and enhancing the visitor economy. General tourism support, while non-specific, has the potential to temporarily increase the local population and contribute to certain types of impact pathways. The following impact pathways may be associated with Policy SP14: • Recreational pressure • Atmospheric pollution • Loss of functionally linked habitat • Water quality • Hydrology • Coastal squeeze Overall, due to its impact potential, Policy SP14 is screened in for AA.

Policy SP15: Climate Change Mitigation and Adaptation	All development proposals must respond to the challenges of climate change by both mitigating its causes and adapting to its impacts. The causes of climate change will be mitigated by ensuring new development proposals: A. Contribute to decarbonisation in their siting, design, construction, mixture of uses and, by following placemaking principles B. Promote the principles of a circular economy by prioritising the reuse of existing buildings and the construction of more adaptable and durable buildings, C. Maximise resource efficiency and sustainable construction techniques, including sourcing materials locally D. Include sustainable building design principles, incorporating passive building techniques where possible E. Maximise the opportunities for carbon sequestration from green infrastructure F. Maximise the opportunities for renewable energy development, specifically in local search areas, to provide 70% of projected electricity demand by 2036. G. Promote the optimisation of energy supply and distribution options, including the provision of district heat networks. New development proposals will adapt to the impacts of climate change by: H. Being designed to respond to a warmer climate I. Promoting urban shading and cooling through the provision of green infrastructure J. Maximising water efficiency and minimise adverse impacts upon quality of water resource K. Redirecting development away from areas of flood risk and ensure that new development suitably controls surface water run-off through the use of sustainable drainage systems and nature-based solutions L. Redirecting development away from areas of coastal erosion. All applications must set out how they mitigate the causes of climate change and adapt to its impacts. Major Developments will be required to be accompanied by Energy Reports to display compliance with criterion D. Where it is proposed to demolish an existing building instead of reusing it, Whole Life Carbon Assessments will be required to ensure compliance with criterion B.	There will be no LSEs of Policy SP15 on European sites. This policy specifies the Council's approach to the challenges of climate change. Among other aspects, new developments will be required to contribute to decarbonisation, promote the principles of a circular economy, maximise resource efficiency. Some of the approaches to tackle climate change may be beneficial to European sites, including maximising water efficiency and minimising water quality impacts. The policy does not allocate quanta or locations of residential and employment development. Overall, therefore, Policy SP15 is screened out from AA.
Policy SP16: Sustainable Waste Management	The sustainable management of waste will be facilitated by:	There will be no LSEs of Policy SP16 on European sites.

	A. Promoting and supporting additional sustainable waste management facilities, measures, and strategies in accordance with the waste hierarchy and the principles of nearest appropriate installation and self-sufficiency. B. Supporting the circular economy by encouraging the minimisation of the production of waste and the use of reused and recycled materials in the design, construction, and demolition stages of development. C. Ensuring that provision is made for the sustainable management, sorting, storage and collection of waste in all new developments. The following locations are considered suitable for the development of in-building waste management solutions: • Atlantic Trading Estate. • The Operational Port of Barry Docks; • Llandow Trading Estate. • On suitable existing and allocated B2 and B8 industrial sites. The provision of open-air sustainable waste management facilities on appropriate Class B2 or B8 industrial sites, operational mineral working sites, derelict land or buildings or within or adjoining existing farm complexes will also be acceptable where they do not conflict with existing or proposed neighbouring uses.	This policy details the Council's approach to sustainable waste management. For example, sustainable waste management facilities will be promoted / supported and the circular economy supported. While potentially suitable locations of in-building waste management solutions are identified, these are not formally allocated. The policy does not allocate quanta or locations of residential and employment development. Overall, therefore, Policy SP16 is screened out from AA.
Policy SP17: Sustainable Provision of Minerals	The local and regional need for the provision of a continuous supply of minerals will be achieved through: A. Maintaining a minimum of 10 years land bank of crushed rock throughout the plan period. B. Favouring proposals which promote the sustainable use of minerals and encourage the use of secondary and alternative resources. C. The safeguarding of known resources of sandstone, limestone, sand and gravel (where these occur outside settlements), from permanent development that would unnecessarily sterilise them or hinder their future extraction; and D. Safeguarding railheads to allow for the potential transportation of minerals by sustainable means and wharf facilities for the landing of marine dredged sand & gravel where appropriate.	There will be no LSEs of Policy SP17 on European sites. Policy SP17 supports the continuous supply of minerals, such as through the provision of a minimum of 10 years land bank of crushed rock, safeguarding known stone resources and protecting railheads. However, the policy does not allocate any specific minerals proposals that would require assessment. Overall, therefore, Policy SP17 is screened out from AA.

Policy SP18: Green Infrastructure	Development proposals will incorporate measures that protect and enhance high quality green infrastructure provision and maximise its functionality. To achieve this, development proposals must: A. Strategically incorporate existing green infrastructure into design, taking advantage of opportunities that are presented by existing and potential assets, through following the principles of placemaking B. Protect and enhance connectivity between green infrastructure assets C. Achieve biodiversity net benefit D. Protect landscapes designated for their geological, natural, visual, historic or cultural significance E. Employ nature-based solutions, including the Building with Nature Standards, where possible F. Provide amenity open space, which fulfils a wide range of roles G. Facilitate environments that promote mental and physical health and well-being H. Promote urban cooling and shading, sustainable drainage systems, and allotments and community orchards.	There will be no LSEs of Policy SP18 on European sites. Policy SP18 is a development management policy that requires development proposals to deliver high-quality and functional green infrastructure. Planning proposals are required to incorporate existing green infrastructure into their design, enhance connectivity between greenspace assets and provide amenity open space. The provision of nature infrastructure is positive for the environment and regarded as one of the most important factors in limiting recreational demand on more sensitive European sites. The policy does not allocate quanta or locations of residential and employment development. Overall, therefore, Policy SP18 is screened out from AA.
Policy SP19: Biodiversity and Ecosystem Resilience	Biodiversity in the Vale of Glamorgan will be protected, maintained and enhanced. Development must provide a net benefit for biodiversity and improve the resilience and connectivity of ecosystems. To achieve this, all developments must: A. Demonstrate that there has been an overall net benefit for biodiversity proportionate to the nature and scale of the development. B. Ensure that UK/European protected species and habitats are protected in accordance with statutory requirements. C. Protect the integrity of statutory and non-statutory designated sites ensuring that they are properly protected and managed.	There will be no LSEs of Policy SP19 on European sites. Policy SP19 ensures biodiversity and ecosystem resilience by protecting and enhancing the Vale of Glamorgan's natural environment. It specifically states that European protected species and habitats should be

D. Be directed away from areas of high ecological value.
E. Incorporate green infrastructure at the early stages of design, that protects and enhances existing site features and improves the connectivity of the ecological network.
F. Incorporate nature-based solutions within development to support biodiversity and build ecosystem resilience within the site and the wider area.

Development on or adversely affecting other non-designated sites or wildlife corridors with biodiversity value will only be permitted where it can be demonstrated that the need for the development outweighs any harm caused by the development and that net biodiversity benefit measures can be provided.

safeguarded in accordance with statutory requirements. It also requires protection of the integrity of statutory designated sites (which includes all SPAs, SACs and, as a matter of Government policy Ramsars).

Regarding HRA, Policy SP19 is integral because it represents the key protective mechanism towards European sites.

The policy does not allocate quanta or locations of residential and employment development.

Overall, therefore, Policy SP19 is screened out from AA.