CONTENTS

INTRODUCTION **14-1**

LEGAL BACKGROUND **14-1**

EIA Regulations 14-1

Planning Practice Guidance 14-1

CUMULATIVE IMPACTS **14-2**

LAND USE **14-3**

Other Mineral Sites 14-3

Other Developments with Similar Characteristics 14-3

ENVIRONMENTAL QUALITY **14-4**

Water 14-4

Transport 14-4

Landscape and Visual Impact 14-5

Air Quality 14-6

Noise 14-8

Cultural Heritage 14-8

Ecology 14-8

INTER-RELATIONSHIPS BETWEEN IMPACTS **14-8**

INTRODUCTION

14.1 Chapters 6 to 13 of this ES have set out the findings of the EIA for a range of environmental topics, and in particular, ascertain the potential significance of identified impacts. The topics considered as part of the EIA are set out in Appendix 1/1 to Chapter 1 of this Volume. It is possible for a number of the environmental topics to impact upon nearby receptors; whilst individually, the impacts may be within accepted limits, collectively the impacts may be more significant. These are referred to as "*inter-relationships between impacts*". At the same time, potential impacts associated with the proposed development may be acceptable in isolation, but when considered in the context of other developments in the immediate vicinity, may become more significant. These are referred to as "*Cumulative Impacts*".

14.2 This chapter of the ES therefore provides an assessment of the potential cumulative impacts arising through the proposed development. It also summarises the main interactions between the environmental topics that form part of the EIA.

LEGAL BACKGROUND

EIA Regulations

14.3 been set out. Paragraph 5(e) to Schedule 4 of the EIA Regulations provides that an ES may contain a description of the likely significant effects of the development on the environment resulting from "*the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources*".

14.4 This is not a mandatory requirement of an ES (being the items listed in Regulation 5(a) to (e)), but one which is required where "*relevant to the specific characteristics of the development and to the environmental features likely to be affected*".

Planning Practice Guidance

14.5 Paragraph 017 (Reference ID: 27-017-20140306) to the web based PPG comments that:

> *"Some parts of a mineral planning authority area may have been subjected to successive mineral development (such as aggregate extraction or surface coal mining) over a number of years. Mineral planning authorities should include appropriate policies in their minerals local plan, where appropriate, to ensure that the cumulative impact of a proposed mineral development on the community and the environment will be acceptable. The cumulative impact of mineral development is also capable of being a material consideration when determining individual planning applications."*

CUMULATIVE IMPACTS

14.6 There is a broad range of opinion on the definition of cumulative impacts[1]. The widely accepted definition is that provided by the United States Council on Environmental Quality in 1978:

> *'the impacts on the environment which result from incremental impacts of the action when added to other past, present and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time".*

14.7 IEMA goes on to comment that cumulative impacts may occur:

Physical-chemical transport	A physical or chemical emission is transported away from a proposed project where it then interacts with another pollutant (e.g., air emissions, waste water effluent, sediment). Several entirely separate developments can therefore have a cumulative impact at a location some distance away from the project location
Nibbling loss	Occurring as a result of the gradual disturbance and loss of land and habitat (e.g., clearing of land for new housing and roads.)
Spatial and temporal crowding	Cumulative effects can occur when too much is happening within too small an area and in too brief a period of time. Spatial crowding results in an overlap of effects (e.g., noise from a road adjacent to an industrial site, confluence of stack emission plumes). Temporal crowding may occur if effects from different actions overlap or occur before the receptor has had time to recover.
Growth-inducing potential	A project can induce further projects to occur. (e.g., bypass for a town creating new development opportunities)
Combined effects	These occur when different types of effects all affect the same receptor. Assessed individually they may be considered to be insignificant, but when combined result in a significant effect on the receptor (e.g. perceived change in the quality of life of a household or community)

14.8 Cumulative impacts have also been described[2] as being those impacts caused by the sum of the projects impacts on the environment component, and/or the projects impacts when added to those of other past, present or future projects. Cumulative impacts can be:

- additive, aggregative or "*nibbling*", namely the simple sum of all of the impacts;

[1] Page 11/4. Guidelines for Environmental Impact Assessment. IEMA
[2] Methods of Environmental Impact Assessment. P Morris and R Therivel. UCL Press 2000

- synergistic, where impacts interact to produce an impact greater than the sum of the individual impact; and
- neutralising or antagonistic impact, where the impacts counteract each other, reducing the overall impact.

14.9 Cumulative impacts may therefore result from a number of situations:

- the interaction or proximity of two or more current quarries (not necessarily for the same type of mineral) or developments of a similar nature;
- the continuation of a particular working over time through successive extensions;
- the interaction or accumulation of different impacts at one site, affecting a range of sensitive receptors; and
- a combination of the above scenarios.

LAND USE

Other Mineral Sites

14.10 Hatfield Quarry, operated by CEMEX, lies to the north of the application site. The processing plant is located off Oaklands Lane, approximately 200m to the west of the application site, whilst the extraction area (based on Google Earth) is located adjacent to Symondshyde Great Wood, around 1000m to the north of the application site. There are no other mineral operations in the immediate vicinity of the application site.

14.11 Permission for Hatfield Quarry was due to expire in October 2020, however, planning permissions have been granted for an extension which allows operations up to c. 2023. In addition, a planning application is being considered for 3.5Mt; this would increase the life of Hatfield Quarry by around 8 years. Considering the potential lead in time should planning permission be granted for Hatfield Aerodrome, the potential overlap would be around 6 years.

14.12 Notwithstanding this, consideration has been given throughout the EIA to the potential for cumulative impacts to arise and no significant effects would arise.

Other Developments with Similar Characteristics

14.13 Other types of development that would potentially have similar characteristics to the quarrying operations would be the construction phase of large housing developments, retail of industrial parks, especially in the context of noise, air quality (dust), movement of plant and machinery and disturbance of the ground (removal of vegetation and soils for example). Planning permission has been submitted for a mixed use (mainly housing) development on the remainder of the Hatfield Aerodrome site. Given the separation distances between mineral operations and the mixed use development, the likelihood for cumulative impacts are low, with the likelihood diminishing as the workings progress away from the first two phases. With the employment of suitable mitigation, cumulative impacts could be suitably ameliorated to acceptable limits.

ENVIRONMENTAL QUALITY

Water

14.14 Chapter 6 of this volume presents the findings of the assessment on the water environment, examining aspects such as the quantity and quality of surface and groundwater resources. Through the design of the site, and following recognised best practices, no significant adverse effect is predicted. Whilst groundwater would be pumped from the workings in the Upper Mineral Horizon, it would be recharged to the aquifer. Allied to this, clay would be used to 'seal' the edges of the workings in the Upper Mineral Horizon.

14.15 Consideration of the potential cumulative effects with the adjacent CEMEX operations has been considered as part of the Groundwater Management Plan, and also noted in Appendix 6/11 (addressing questions posed by Affinity Water in the Scoping Opinion). Suitable mitigation has been designed into the scheme to ameliorate any significant adverse effects.

14.16 Accordingly, as no significant adverse effect is predicted, no significant cumulative impacts are predicted with other developments.

Transport

14.17 Consideration has been given to the predicted increase in traffic as a result of the development. The assessment has used data from traffic counts undertaken in 2015 along with published data for 2019; this baseline data will include HGV traffic from Hatfield Quarry, and thus the assessment is cumulative. Whilst other developments, mainly housing, are being promoted into emerging Development Plans the precise details are not currently known and thus it is not possible to assess any likely cumulative impacts. Notwithstanding this, traffic associated with the quarry would be reasonably evenly distributed throughout the day; whereas housing developments tend to have peaks consistent with morning and afternoon 'rush hours'. Allied to this, traffic using visiting the quarry would use the primary road network, such as the A1057.

14.18 Arlington Business Parks GP Limited submitted an Outline Planning Application (6/2018/2768/OUTLINE) to Welwyn Hatfield Borough Council for a "*…large-scale mixed use development including 1,100 new homes and supporting infrastructure including a primary school, local centre and open space with all matters reserved*". At the time of writing Hertfordshire County Councils' planning portal records the status of the application as 'Under Consideration'.

14.19 The assessment work by Vectos concluded that the significance of the effects of the completed development on the relevant factors - i.e. Severance, Pedestrian Delay, Pedestrian Amenity, Driver Delay, Accidents & Safety, and Public Transport – would be 'Negligible' in all cases save for Severance and Pedestrian Amenity, both of which were expected to suffer only 'Minor Adverse' effects.

14.20 Accordingly, as no significant adverse effect is predicted, no significant cumulative impacts are predicted with other developments.

Landscape and Visual Impact

14.21 Chapter 8 of this volume has considered both cumulative landscape and visual effects. the assessment focuses on the cumulative landscape effects of the proposed development in conjunction with the operational Hatfield Quarry to the north and proposed major Hatfield Garden Village housing development to the north east; all three of these sites lie within "Area 31 De Havilland Plain".

14.22 Application reference 5/1240-14 describes how "*Hatfield Quarry (the Quarry) has been an active sand and gravel and waste site since the 1940/50's based on planning records held by the mineral planning authority, the Quarry having been used as a disposal point for household waste at various times and locations…The current sand and gravel workings take place approximately one to two kilometres north west of Cut Field with aggregates processing, storage and distribution taking place approximately one kilometre to the south west*".

14.23 An application has been submitted (October 2018) for the working a new extension to Hatfield Quarry. The application area is 117ha of predominately agricultural land adjoining Coopers Green Lane, on the periphery of the Hatfield Garden Village development on the north west of Hatfield Town Centre. The site would be linked to the existing CEMEX Hatfield Quarry by a conveyor link approximately 4km in length, utilising part of the existing conveyor link that passes to the north of the proposed development.

14.24 The proposed housing development (67.5 ha) is an extensive site along the western edge of Hatfield and effectively links the proposed CEMEX extraction area with the proposed development area resulting in major change along a large proportion of the western edge of Hatfield. These three developments together therefore have the potential to greatly affect the perception of the western edge of Hatfield and nature of the town's boundary.

14.25 The cumulative effect on "Area 31 De Havilland Plain" also has the potential to be great. However, the De Havilland Plain is identified as being in poor condition, with a moderate strength of character and a management objective of 'improve and restore'. There is thus a degree of acceptance to change as opposed to trying to conserve, strengthen or reinforce existing character.

14.26 Because of the conveyor link the two proposed mineral extractions would be perceived as separate areas and not together, although each may be perceived in conjunction with the housing development. Mitigation of the potential level of change is present in the form of the extensive amount of open space included with the housing development (53% of the housing development area). This would create a more permeable landscape with green links from the existing urban edge out to the green belt further west. In a similar way the phased working and restoration of the two mineral developments would reduce the level of disturbance present at any one stage. Ultimately both mineral developments would be fully restored and creating an extended area of habitat and recreational benefits to the north and south of the housing development and enhancing the remaining green belt.

14.27 The presence of "*existing and restored mineral workings*" is already one of the key characteristics of "Area 31 De Havilland Plain". Therefore, the addition of the proposed development, to the ongoing operations at Hatfield Quarry would not give rise to changes in landscape character of such an extent as to have major effects on its key characteristics or transform it into a different character type; it is not considered that the development "*tips the balance*" through its additional effects.

14.28 Consideration has also been given in Chapter 8 to the potential cumulative visual effects of the proposed development with the proposed development at Hatfield Quarry and the major housing development, Hatfield OPA (aka Hatfield Garden Village).

14.29 No occurrence of simultaneous visibility of the two mineral excavations is predicted due to their physical separation and intervening presence of the town of Hatfield. However, the retained plant site and conveyor link at Hatfield Quarry would lead to some limited simultaneous visibility with the proposed development at the following locations:

- users of the public right of way to the north of the application site, near to the Hatfield Quarry conveyor (Viewpoint 1); and
- users of public right of way to the west of the application site, parallel to Oaklands Lane, near to the Hatfield Quarry processing plant site area and perimeter soil storage bund (Viewpoint 8).

14.30 However, in each case the proposed development would be in a different direction to the elements and features of Hatfield Quarry, meaning that walkers along the route would be looking around to experience any potential coalescence.

14.31 Visual interaction with the proposed housing development would also be limited due to the screening vegetation around the edge of the proposed development site. Viewpoint 6 looks north east across the proposed development site and would see the phased extraction and restoration process set against the urban elements of Hatfield Business Park and Hertfordshire University. The proposed housing development would infill between these two existing urban features increasing the extent of the overall urban component of the view. Similar effects would occur in views in the opposite direction from the housing development, intervening vegetation, mounds, and hedgerow planting would reduce visibility at ground level, but upstairs windows are likely to have more extensive views. Such views may include the CEMEX processing plant, thus creating a cumulative effect in conjunction with the proposed development plant site, although such effects would be limited due to the screening provided by Home Covert.

14.32 The other potential cumulative visual effects are of a sequential nature, for example users of the road network or recreational visitors moving along the rights of way. However, this is also considered to be limited and mitigated by the existing urban fringe character of area and roadside vegetation screening.

14.33 Overall, there are no significant cumulative visual effects anticipated because of the proposed development.

Air Quality

14.34 Cumulative consideration has been given to pollutant contributions associated with both road traffic and fugitive dust releases at human receptor locations, where relevant. Effects were found to be not significant.

14.35 Cumulative dust-led impacts from other quarries have the potential to arise where processes overlap at a receptor location. For human health (ambient PM concentrations), a 1km distance threshold is prescribed by IAQM guidance, consistent with national planning policy. Whereas for dust deposition effects (human and ecological), dust impacts from sand and gravel sites are uncommon beyond 250m from the nearest dust generating activities. As established above, no

statutory ecological receptor exists within 250m of the site, therefore no cumulative impacts can arise.

14.36 It is acknowledged that a planning application for an extension of a sand and gravel quarry at Hatfield Quarry off Oaklands Lane (land adjoining Coopers Green Lane) is under consideration – located north east of the application site. A review of the health impact assessment submitted for that application was undertaken.

14.37 Dispersion modelling of proposed fugitive dust sources was undertaken in support the assessment, limited to three extraction sites (located approximately 2km north east from the application site) and supporting (new) infrastructure (e.g. conveyors). The full extent of new sources considered are located 1.3km from the application site. As such, cumulative effects associated with dust disamenity arising from the proposed extraction sites and supporting infrastructure can therefore be scoped out given the separation distances between proposed sources (>500m i.e. 250m + 250m process contribution overlap from sand and gravel sites) and limited likelihood of effects arising.

14.38 The Hatfield Quarry off Oaklands Lane sand and gravel quarry will be served by existing infrastructure (CEMEX Hatfield processing plant and supporting conveyor lines) located north and west of the application site. These sources were not considered as part of the Hatfield Quarry off Oaklands Lane dispersion modelling assessment on the assumption that throughput is to remain unchanged and are sufficiently distant from any new source for cumulative effects to arise. The processing plant is located approximately 200m from the application site. However, despite this all receptors considered are not found to be located within 250m from both sources. As such, cumulative effects associated with existing and proposed operations relative to the CEMEX Hatfield processing plant and supporting conveyor lines can be scoped out.

14.39 As discussed above, the maximum modelled PM_{10} and $PM_{2.5}$ concentrations reported within the accompanying health impact assessment (relating to proposed operations) for all receptors and phases considered has been added to the future year modelled concentrations to address potential cumulative impacts (i.e. 2023 DM and DS). This approach is believed to be conservative on reflection, as assumes the maximum modelled concentration at all receptors for those sources considered is constant across the modelled area, not accounting for dispersion and dilution with distance - contrary to established guidance (IAQM). Furthermore, this approach is considered to be suitably conservative in the absence of PM_{10} and $PM_{2.5}$ modelled contributions from existing sources (CEMEX Hatfield processing plant). Despite this, existing sources (such as the processing plant) are believed to be suitably covered through inclusion within the relevant background concentrations given that throughput is not expected to change.

14.40 In relation to road traffic emissions, traffic flows used for the air quality assessment includes vehicle movements associated with committed developments in the assessment area.

14.41 The air quality assessment, and the results presented are therefore inherently cumulative, where relevant.

14.42 Furthermore, all modelled concentrations/deposition rates are considered to be well-below the respective environmental benchmarks despite the conservative assessment methodology adopted (i.e. use of dust emission factors derived from arid conditions, 2019 road traffic emission factors and background concentrations). Therefore, the likelihood of a cumulative effect or exceedence arising outside of the operational envelope assessed is low.

Noise

14.43 Like transport considered above, the assessment (Chapter 10 of this Volume) uses measured data, which will include the operation of Hatfield Quarry. As such the assessment is cumulative. The assessment found that the potential increase in ambient levels due to worst-case operational noise would be slight at worst at two receptors but generally not significant at the remainder of the nearby noise-sensitive receptors.

14.44 It should be noted that, at Radio Nursery and the proposed new development to the west of the site, the existing measured noise levels were measured away from the working nursery and therefore are considered to be conservative.

Cultural Heritage

14.45 As set out in Chapter 12 of this volume there are considered to be no cumulative effects of the proposed scheme upon cultural heritage.

Ecology

14.46 Whilst the development would result in the loss of habitat, through suitable mitigation, including the restoration of the workings, no cumulative impacts are predicted with other developments.

INTER-RELATIONSHIPS BETWEEN IMPACTS

14.47 As set out above, elements of a development can give rise to inter-related impacts. The approach taken in the EIA has been to assess how a particular type of effect (*e.g*. movement of HGVs) may become a source of impact that results in an effect to a completely different category of receptor. Like cumulative impacts, these inter-relationships have been considered within each of the technical assessments for the environmental topics.

14.48 Examples of inter-relationships are:

- the movement of HGVs within the site can impact upon the noise climate around the site. This is addressed in Chapter 10 of this Volume;
- the movement of HGVs around the site and on the public highway can impact upon air quality. This is addressed in Chapter 9 of this Volume;
- the construction of screening mounds, whilst ameliorating noise impacts, can affect the visual appearance of the site. The potential visual impacts of the development are considered in Chapter 8.

14.49 Finally, interactions between more than one type of impact may be experienced at a particular receptor. As a hypothetical example, a receptor may experience increased levels of noise and deposition, or noise and visual impacts; such impacts may occur simultaneously, sporadically or on separate occasions. There is, however, no physical mutuality between the impacts, other than that both could cause annoyance, whether experienced separately or simultaneously.

14.50 For the proposed quarry, no significant impacts have been identified for any of the environmental topics considered as part of the EIA. Thus, no receptors are likely to experience any significant accumulated impacts from two or more sources.