CONTENTS

INTRODUCTION

15.1 Chapters 5 to 14 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 Chapter 1 of this Volume (paragraph 1.49). 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*".

15.2 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

15.3 Within Chapter 1 of this Volume, the statutory requirements regarding the content of an ES have been set out. Part 1 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, which should cover … cumulative … effects".* The same Part also states that *"a description of the aspects of the environment likely to be significantly affected by the development including … [the environmental topics] …and the inter relationship between the above factors*".

15.4 These are not a mandatory requirement of an ES, but one which "*is reasonably required to assess the environmental effects of the development and which the applicant can, having regard in particular to current knowledge and methods of assessment, reasonably be required to compile*".

TAN 21: Waste

15.5 In relation to the location of waste management facilities TAN 21 at paragraph 3.27 comments that consideration needs to be given to:

- *"the cumulative effect of waste management facilities and other development on sensitive environmental receptors is acceptable;*
- *the cumulative effect of waste management facilities and other development on the well-being of the local community, including any significant adverse impacts on environmental quality, social cohesion and inclusion or economic potential is acceptable*".

CUMULATIVE IMPACTS

15.6 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".

15.7 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)

15.8 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.

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

- the interaction or proximity of two or more current waste management facilities (not necessarily for the same type of facility) 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

15.10 Within the vicinity of the application site there are no other waste management facilities. However, there are several energy generating plants locally, including a biomass plant at UPM Shotton Paper Mill and other gas fired power stations.

15.11 As noted from Chapter 4 above, the application site is allocated for employment uses and is also allocated as being a suitable location for waste management uses (policies EM1 and EWP6 refer). Other industrial allocations exist on neighbouring land as well as an overarching '*Development Zones and Principal Employment Areas'* allocation through policy EM3. As such, subject to meeting the criteria to policy EM1, the development of an ERF is in line with the Development Plan.

15.12 Considering the potential for cumulative impacts, it is the industrial undertakings in the area which need to be considered. Potential impacts would arise through movement of HGVs, air quality (from traffic and process), noise (traffic and process), landscape and water.

POTENTIAL IMPACTS

Transport

8.1 Chapter 8 of this Volume has provided a detailed Transport Assessment of the proposals. The assessment has considered both growth in traffic on the highway network. FCC Highways Development Control confirmed that the scope of the proposed transport assessment was acceptable; also stating the following with regards to committed development:

> *"There are a number of consented developments within the vicinity of the site and a number of others that are currently under construction however none of these are of a nature requiring TIAs. On that basis I would suggest that there is no additional traffic from committed development to be included within your junction assessment but suggest*

that an allowance for growth up to year of opening be made in the usual way".

15.13 The analysis within Chapter 8 demonstrates that the development traffic associated with Parc Adfer would have a very minor impact on the roundabout junction, which is likely to be imperceptible and within daily fluctuations in traffic levels. A robust approach has been adopted throughout which assumes all staff would drive separately, whereas in reality many staff would use alternative modes to get to and from work such as car sharing, public transport, cycle and those that live close enough, by foot.

Air Quality

15.14 Cumulative impacts on air quality would result from traffic using the highway network and emissions from industrial processes. Baseline data has been obtained through monitoring air quality around the application site. This data will include emissions from the existing sources, allowing for a cumulative assessment to be undertaken. The predicted long-term process contributions from the proposed ERF have then been combined with the background concentration to identify the predicted environmental concentrations (PEC). This is considered further in Chapter 6 of this Volume.

15.15 The traffic generated NO_2 and PM_{10} associated with the development of Parc Adfer is 'imperceptible' and there is therefore no requirement for further consideration to be given to the potential for combined impacts from traffic movements and the same pollutants from the ERF stack.

15.16 The air quality impact of the existing industrial facilities in the area (such as the Shotton paper mill, TATA Steel and Deeside gas fired power station for example) is encompassed within the monitoring data collected by Flintshire and SLR Consulting. The Shotton gas-fired Combined Heat and Power (CHP) generating station ceased generating power in June 2012.

15.17 There are no other consented (but yet to be developed) schemes in the area with the potential to lead to significant cumulative effects given that the impacts of the ERF are 'imperceptible'.

Noise

15.18 For noise, cumulative impacts can occur if noise from the proposed ERF would add significantly to background noise levels at nearby receptors. In the vicinity of the application site, the noise climate is predominantly affected by traffic noise on the local highway network and other industrial premises.

15.19 Chapter 9 of this Volume sets out a detailed noise assessment, based on worst case predictions on noise propagation. The assessment, which is based on recognised standards, compares predicted noise levels against measured background noise levels to assess the likely degree of impact. In so doing, the assessment considers the likelihood for cumulative impacts to occur.

15.20 Without exception, the noise assessment has demonstrated that noise levels associated with Parc Adfer at nearby receptors would be below the measured background noise levels at all times. Moreover, based on recognised guidance contained in BS4142, the "*likelihood of complaints is unlikely*" even when including the addition of a 5dB penalty for possible tonal content of the noise sources, including the addition of a 5dB penalty for possible tonal content of the noise sources.

Landscape and Visual

15.21 Chapter 7 within this volume has set out the findings of a detailed landscape and visual impact assessment, undertaken in accordance with GLVIA3[3]

15.22 Development of Parc Adfer would have a very limited direct landscape impact on the application site as it is in effect set aside as a development plot. Any cumulative impacts would therefore relate to the perceived effect on the landscape and the 'cumulative contribution' that the buildings make, which is likely to be minimal, particularly when taking into account the Employment Zone designation which is likely to prompt development of the application site and its surrounding plots irrespective of the proposals.

15.23 Existing power stations and other large industrial units such as the TATA Steel works have resulted in a far more significant effect on how the landscape is perceived and potentially increase the capacity of the landscape to accommodate other smaller scale changes. As described via the assessment the proposed development is within what is already a well established industrial area; as such it would only have a limited effect on how the landscape is perceived so its contribution to cumulative effects would be minimal.

15.24 The proposed ERF would potentially give rise to a range of visual effects. This is described in detail via the 'Visual Impact Assessment' chapter which breaks down the significance of impacts for each of the selected viewpoints and takes into account the effect of other development and visual context as part of the 'susceptibility to change' and predicted 'magnitude of change'.

15.25 As identified via the assessment the range of visual effects varies, as would the potential contribution to 'cumulative effects'. Cumulative effects would, as previously described, potentially occur when the proposed Parc Adfer ERF development is seen in conjunction with other comparative types of development/activity. In all cases the proposed ERF would be seen as a part of its industrial context within the Deeside Industrial area, and 'sequentially' with other industrial type development within the area i.e. appearing and disappearing from view while moving along a section of road or footpath.

15.26 The fact that the adjacent GDF Suez Power Station is likely to be decommissioned and demolished in the coming years would be seen as positive in terms of the cumulative effect, as the ERF would 'replace' rather than 'add to' what is seen at present. However, in the longer term it is likely

[3] Guidelines for Landscape and Visual Impact Assessment. Landscape Institute. Edition 3, April 2013

that the GDF Suez site will also be redeveloped at some stage; this being an intrinsic part of the dynamics of an industrial landscape.

15.27 Most industrial/commercial type development is found within the valley floor/adjacent to the banks of the Dee, with the scale and height of the buildings/associated stacks meaning that they are broadly visible from both the valley sides and across the open estuary.

15.28 Outside of the industrial and urban areas the area is generally comprised of agricultural land uses inter-dispersed with scattered villages and individual dwellings. While there are some larger scale agricultural units and seasonal ground disturbance associated with working the land this is unlikely to be seen as akin to the 'industrial' nature of the proposed Parc Adfer ERF; the only bearing this may have on cumulative effects being that agricultural activity portrays the context of a wider 'working landscape'.

Water

15.29 The potential for cumulative impacts to the water environment is predominantly associated with surface water run-off entering water courses, which, if not managed, could cause pollution or flooding downstream.

15.30 The design of the proposed Parc Adfer ERF has large areas of impermeable surfacing, including roof plane and roadways/vehicle manoeuvring areas. Allied to this, there are large areas of hard surfacing and roof planes associated with other industrial operations in the area, notably UPM Shotton Paper Mill to the west and TATA steel to the southwest, together with the wider industrial area to the east of the railway line (and east of the application site). Without mitigation, there is the potential for an accumulation of pollutants, such as suspended solids, and high levels of surface water runoff in storm events.

15.31 Chapter 10 of this volume has set out a detailed assessment of the potential impacts upon the water environment. Mitigation, in the forms of SuDS, has been proposed to manage surface water. Through the use of SuDS, discharge from site to the watercourse that runs close to the northeastern boundary of the application site can be limited to "*greenfield*" levels. To demonstrate this, a Flood Consequences Assessment has been undertaken (see Appendix 10/1) which has concluded that so significant impacts would arise.

INTER-RELATIONSHIPS BETWEEN IMPACTS

15.32 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.

15.33 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 9 of this Volume;
- the movement of HGVs around the site and on the public highway can impact upon air quality. This is addressed in Section 6 of this Volume;
- the dispersion of emissions from the stack, and in particular consideration of its height, has been considered in Chapter 6 of this Volume (with associated Appendix 6/1), whilst the potential visual impacts of the stack height are considered in Chapter 7; and
- similarly, the potential impact of the emissions on ecological receptors is also considered in Chapter 6, along with Chapter 11.

15.34 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.

15.35 For Parc Adfer, 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.