21 SUMMARY OF RESIDUAL AND CUMULATIVE EFFECTS

21.1 Residual Effects

21.1.1 A crucial part of the EIA process is to assess the significance of the effects following implementation of proposed mitigation measures, otherwise known as 'residual effects'.

21.1.2 A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects, i.e. the mitigation measures, has been set out within each technical chapter (7 – 20). The implementation of these measures has been used to reduce impacts to the lowest practicable level consistent with the overall objectives of the Proposed Development. Any residual effects, either during the construction or operational period, or in the long-term, are then identified and the significance of these residual impacts is assessed within each technical chapter.

21.1.3 Following the implementation of the mitigation measures outlined within each technical chapter, the majority of residual environmental effects have been assessed as being not significant, as summarised within Table 21.1. Further details are provided within the relevant technical chapter.

Table 21.1: Summary of Significant Residual Effects

Technical Chapter	Significant Residual Effects?
Traffic and Transport	Yes (beneficial)
Water Resources	No
Ground Conditions	No
Biodiversity	Yes (beneficial)
Air Quality	No
Noise and Vibration	Yes (temporary adverse)
Cultural Heritage	No
Socio-economics	Yes (beneficial)
Health	Yes (beneficial and adverse)
Townscape and Visual Amenity	Yes (beneficial and adverse)
Climate Change	Yes (beneficial and adverse)
Materials and Waste	No
Wind Microclimate	No
Daylight, Sunlight and Overshadowing	Yes (adverse)

21.1.4 As stated within Table 21.1, the Proposed Development will result in limited, residual significant adverse effects in relation to aspects of Noise, Townscape and Visual Amenity, Daylight, Sunlight and Overshadowing, Climate Change and Health. The Proposed Development will result in residual beneficial effects in relation to certain aspects of Townscape and Visual Amenity, Health, Biodiversity, Traffic and Transport, Climate Change and Socio-economics.

21.1.5 During the demolition and construction phases of the Proposed Development, the Noise and Vibration assessment has identified the potential for up to moderate adverse effects on sensitive receptors. This effect will be temporary over a short-term and mitigation measures will be implemented to reduced potential effects as much as possible.

21.1.6 The visual effects are unavoidable given the scale of the Proposed Development; however, the visual impacts of the development have been one of the key considerations in the design process. Mitigation for the potential visual effects of the Proposed Development has been incorporated into the design of the scheme with the implementation of a Landscape Masterplan, which will be submitted in support of the planning application.

21.1.7 Following mitigation, the Proposed Development would result in a limited number of significant residual effects upon long term views, confined to residents bordering / overlooking the Site along Lloyd George Avenue and around Bute East Dock, including the DYZYN apartment blocks and visitors and recreational users around Bute East Dock. These would typically result from the proximity of existing residential outlooks at short distance towards either the Arena or the high-rise blocks within the Bute East Dock or Waterfront Quarters, on changes to views from around the Bute East Dock looking towards the Proposed Development in these Quarters.

21.1.8 The Townscape and Visual Amenity assessment identified moderate beneficial effects of the Proposed Development in relation to effects on townscape character on completion in terms of the Site and its immediate setting, and effects of visual receptors in relation to Public Right of Way users along the Wales Coast Path.

21.1.9 The Daylight, Sunlight and Overshadowing assessment has identified the potential for significant adverse effects for some areas of the properties on Lloyd George Avenue, including Schooner Way and Hemingway Road façades, and Galleon Way properties. At Lloyd George Avenue and the Schooner Way façade, the impacts of the Arena

development are considered to be minor / moderate, however, this is limited to two kitchens out of ninety-six rooms assessed.

21.1.10 The assessment has concluded that in relation to the illustrative masterplan, for properties on the Hemingway Road façade and Galleon Way, daylight levels will be adversely affected with impacts considered to range from minor / moderate to major. At detailed design stage, mitigation measures may be considered following further assessment.

21.1.11 When assessing decommissioning and construction phase emissions of the Proposed Development, the Climate Change assessment has determined a moderate adverse effect. The implementation of further mitigation measures will assist in limiting this effect where possible. For operational emissions, the assessment identified a positive impact determined as significant, as relative CO_2e emissions for the Proposed Development are over 5% less than the baseline scenario.

21.1.12 The Health assessment identified that during the construction phase, the Proposed Development would have a moderate adverse residual effect due to loss of the southern part of Silurian Park, which is considered to worsen access to open space and nature.

21.1.13 The Health assessment has found, however that the Proposed Development would likely have a moderate beneficial residual effect due to the number of jobs directly generated by construction which will improve income and employment provision. Significant moderate beneficial residual effects are also anticipated in terms of Health during the operational phase of the Proposed Development due to the provision of housing, social infrastructure, improved access to open space and nature, improved accessibility in terms of public transport services, and the generation of jobs as a result of the Proposed Development. These provisions would bring positive health outcomes by improving the quality and design of housing, increasing access to basic needs and leisure facilities, improving accessibility, and income and employment provision.

21.1.14 The Biodiversity assessment identified that with mitigation measures in place during the construction and operational phases of the Proposed Development including a lighting strategy, habitat enhancement, increased linear features and the installation of bat boxes, there is anticipated to be a moderate beneficial effect on bats.

21.1.15 The Traffic and Transport assessment has concluded that there will be a moderate beneficial residual effect in relation to fear and intimidation for pedestrians and cyclists during operation of the Proposed Development. This is due to the potential for the design of the Site and the routes within it to affect perceptions of amenity, fear and intimidation by creating an attractive and secure environment.

21.1.16 There are also predicted to be moderate beneficial effects in relation to socio-economics due to the employment opportunities presented to those seeking employment during the construction and operational phases of the Proposed Development. The Socio-economics assessment has also identified a major beneficial effect of the Proposed Development on community cohesion during the operational phase on existing residents and future visitors.

21.2 Cumulative Effects

21.2.1 Schedule 4 of the EIA Regulations states that an ES must include a description of the likely significant effects of the development, including reference to possible cumulative effects.

21.2.2 When considering potential significant cumulative impacts, the assessments have (where appropriate) considered:

- Intra-cumulative effects (i.e. those occurring as a result of the Proposed Development in isolation); and
- Inter-cumulative effects (i.e. those occurring as a result of the Proposed Development in combination with other development).

21.2.3 An assessment of the potential cumulative effects was undertaken within each of the technical chapters.

21.2.4 A summary of the cumulative effects of the Proposed Development are provided below and within Table 21.2, with further details provided within each technical chapter.

Intra-cumulative effects

21.2.5 The EIA has taken into consideration where a significant residual impact is expected to occur on a particular receptor as a consequence of collective actions, aspects or effects of the Proposed Development. These inter-relationships have been

considered within each technical chapter as relevant and no significant intra-cumulative effects were identified.

Inter-cumulative effects

21.2.6 In relation to inter-cumulative effects, the EIA has considered committed developments in the area surrounding the Site which, in conjunction with the Proposed Development, could collectively impose a significant impact on the environment.

21.2.7 Further details on the schemes considered are set out within Chapter 5 (Approach to Environmental Impact Assessment), Section 5.6.

Table 21.2 Summary of Cumulative Effects	
Technical Chapter	**Summary of Cumulative Effects**
Traffic and Transport	The assessment has concluded that in terms of cumulative effects, with the implementation of appropriate mitigation measures for each development, there are **no significant cumulative effects in relation to traffic and transport.**
Water Resources	The assessment is based on the expectation that for each development, construction and operation would be undertaken in line with industry best practice, and implementation of mitigation measures where appropriate. Therefore, it is believed that the other committed developments, in combination with the Proposed Development, will result in **no significant cumulative effects in relation to water resources.**
Ground Conditions	Effects that have been identified are considered to be localised. Given the non-significance and localised nature of the potential effects it is considered unlikely that any cumulative effects would occur. As such there are **no significant cumulative effects in relation to ground conditions.**
Biodiversity	The assessment has concluded that there is relatively low species diversity within the Site and that despite unavoidable building demolition and potential disruption to roosting bats, ecological enhancements are considered to have a positive effect. **The cumulative effects of the Proposed Development are considered to have positive ecological impacts.**
Air Quality	The assessment has concluded that in terms of inter-cumulative effects, the presented results incorporate committed developments within the baseline traffic for the Opening Year Scenarios, therefore the cumulative impact of the Proposed Development scheme along with other developments has been assessed and there are **no significant cumulative effects in relation to air quality.**

Table 21.2 Summary of Cumulative Effects	
Technical Chapter	**Summary of Cumulative Effects**
Noise and Vibration	The cumulative effects assessment has considered the potential cumulative effect within the locality of the Proposed Development and determined that with mitigation measures in place there will be no change in the observed noise levels at existing or proposed sensitive receptors. As such there are **no significant cumulative effects in relation to noise and vibration.**
Cultural Heritage	The cumulative effects assessment has considered schemes in the vicinity of the Proposed Development. It has found that due to the distance of these schemes from the Site and the intervening built environment, there are **no significant cumulative effects in relation to cultural heritage.**
Socio-economics	There is potential for cumulative construction impacts which is determined by the availability of the workforce and overall impact on the supply chain if multiple developments were to proceed at the same time. More detail would be needed to assess the cumulative impacts on social infrastructure of other proposed developments in Butetown and the surrounding area.
Health	No cumulative health effects were identified based on the review of cumulative impacts reported by other chapters relating to health (Traffic and Transport, Air Quality, Noise and Vibration, Socio-economics, Townscape and Visual Amenity and Climate Change). There is a potential for cumulative impact of construction of committed developments on access to social infrastructure however, more detail would be needed to fully assess this impact which is not available at this stage.
Townscape and Visual Amenity	Cumulative effects were considered in terms of effects upon townscape character and visual resources. None of the cumulative schemes are considered to result in significant cumulative townscape effects or effects on identified visual receptors and subsequently there are **no significant cumulative effects in relation to townscape and visual amenity.**
Climate Change	Climate change is considered a global issue and therefore a comprehensive consideration of inter-cumulative effects would need to account for every other development and activity that generates carbon emissions or releases other greenhouse gas effects. As this encompasses activity on a global scale it is not practical to consider inter-cumulative effects, beyond recognising that it is necessary to reduce carbon emissions across the board and each and every development has a duty to minimise its own emissions as far as technically viable.
Materials and Waste	It is expected that any increase in demand for waste management infrastructure resulting from cumulative developments during

Table 21.2 Summary of Cumulative Effects	
Technical Chapter	**Summary of Cumulative Effects**
	construction will remain negligible, and when operational, will cumulatively be comparable to that expected from the Proposed Development. The cumulative effects assessment found that other committed developments, in combination with the Proposed Development, result in **no significant cumulative effects in relation to materials and waste**.
Wind Microclimate	The cumulative surroundings located immediately to the west of Lloyd George Avenue and to the south of the A4232 were considered as part of the cumulative effects assessment. Due to the massing details, height and distance from the Site of the cumulative surroundings, no adverse impact on the local windiness within and around the Proposed Development, is anticipated, therefore it is considered that there will be **no significant cumulative effects in relation to wind microclimate.**
Daylight, Sunlight and Overshadowing	Of the potential cumulative schemes that have been considered in the EIA, none were deemed sufficiently close enough to significant receptors or the Proposed Development to have a cumulative impact on daylight and sunlight. As such no inter-cumulative effects or intra-cumulative effects have been included in the daylight and sunlight assessments.