			views. As such effects a considered neutral.	
2	Viewpoint 2 is taken from The Close within Ballycullen Gate and is representative of views experienced by residential receptors. Views towards the site are precluded by vegetation along the south western edge of the Ballycullen Gate development.	Medium	Vegetation along the southwestern edge of the Ballycullen Gate development precludes any views of the proposed development. Whilst winter conditions may act to marginally increase visibility, given the density of the vegetation, any views would remain heavily filtered. Any parts of the development visible would generate minimal change to views and would not be readily discernible. The magnitude of visual impact is deemed Negligible. The proposed development is not considered to notably improve, nor detract from views. As such effects are considered neutral. It is noted that th intervening landscape ma be subject to in development as a result the realignment of the ES power cable wayleave.	Imperceptible Neutral Permanent
Vp	**Existing view**	**Sensitivity**	**Magnitude**	**Level of Effect**
3	Viewpoint 3 is taken from Dodderbrook Drive within Dodderbrook Phase 1 and is representative of views experienced by residential receptors (albeit subject to variation as a result of property orientation). Views towards the site are precluded by	Medium	Visibility of the site and the proposed development will be restricted by vegetation present in the intervening landscape. Any seasonally increased degree of visibility will be marginal, and those parts of the development visible will remain filtered. Whilst partially screened, it is recognised that the development	Slight Neutral Permanent

	vegetation along the edge of Dodderbrook Phase 1, and belts of vegetation in the intervening landscape.		would be visible through and above this existing vegetation. From this location, views to the wider elevated landscape are restricted by vegetation, and this moderates the degree to which the proposed development changes the overall composition of views. The magnitude of visual impact is deemed Medium-Low. Whilst partially visible fro this location, the propose development is n considered to notab improve, nor detract fro views. As such effects a considered neutral.	
4	Viewpoint 4 is taken from Dodderbrook Glade within Dodderbrook Phase 2 and is representative of views experienced by residential receptors (albeit subject to variation as a result of property orientation). Views towards the site are restricted by existing built form, and by belts of vegetation present in the intervening landscape.	Medium	Visibility of the site and the proposed development is restricted by existing built form, and by belts of vegetation. Although winter leaf loss may increase the degree of visibility, the density of this vegetation in combination with new planting will mean that this seasonally increased visibility is marginal. Whilst partially screened, it is recognised that the development would be visible through and above this vegetation, and that the foreground of views would be influenced by an opening along the intervening boundary, and a continuation of the open space towards the proposed Oldcourt Park. In combination these elements would generate a change to the composition of views towards the upland landscape to the south, albeit of a nature that is consistent with the immediate urban context. Importantly, the proposals would not obscure views of	Moderate-Slight Neutral - Negative Permanent

			the more elevated parts of the landscape. The magnitude of visual impact is deemed Medium-Low. Whilst the influence of urban development in views over a comparatively undeveloped landscape is considered adverse in nature, owing to the immediate urban context of the view, the fact that the proposals maintain a visual relationship with the elevated landscape, and incorporate planting that with maturity would improve the density and character of the wider belt of vegetation, the quality of the effects are considered to be neutral tending towards negative.	
5	Viewpoint 5 is taken from corner of Dodderbrook Rise and Dodderbrook Avenue within Dodderbrook Phase 2 and is representative of views experienced by residential receptors (albeit subject to variation as a result of property orientation). Views towards the site are restricted by close boarded fencing along the boundary of the site, and by subsequent belts of vegetation present in the intervening landscape.	Medium	Visibility of the proposed development is restricted by the foreground fencing and belt of vegetation, resulting in partial views of upper parts of the built form. Although winter leaf loss may increase the degree of visibility, the density of this vegetation in combination with new planting will mean that this seasonally increased visibility is marginal. However it is recognised that the development would be visible, and would generate a degree of change in views towards the upland landscape to the south. As with VP4, the nature of the change is deemed to be consistent with the immediate urban context, and the proposals would not obscure views of the more elevated parts of the landscape. The magnitude of visual impact is deemed Medium-Low. Whilst the influence of urban development in views over a comparatively undeveloped landscape is considered adverse	Moderate-Slight Neutral - Negative Permanent

			in nature, owing to the immediate urban context of the view, the fact that the proposals maintain a visual relationship with the elevated landscape, and incorporate planting that with maturity would improve the density and character of the belt of intervening vegetation, the quality of the effects are considered to be neutral but tend towards negative. It is noted that th intervening landscape ma be subject to in development as a result the realignment of the ES power cable wayleave.	
6	Viewpoint 6 is taken from Dodderbrook Lawn within Dodderbrook Phase 2 and is representative of views experienced by residential receptors (albeit subject to variation as a result of property orientation). Views towards the site are restricted by close boarded fencing along the boundary of the site, and by subsequent belts of vegetation present in the intervening landscape.	Medium	Visibility of the site and the proposed development will be restricted by vegetation present along the edge of Dodderbrook Phase 2, and belts of vegetation in the intervening landscape. Any seasonally increased degree of visibility will be marginal, as illustrated at this location with photomontages produced in both winter and summer conditions. Whilst partially screened, it is recognised that the development would be visible through and above this vegetation, and that the foreground of views would be influenced by an opening along the intervening boundary, and a continuation of the open space towards the proposed Oldcourt Park. In combination these elements would generate a change to the composition of views towards the upland landscape to the south, albeit of a nature that is consistent with the immediate urban context.	Moderate-Slight Neutral - Negative Permanent

			Importantly, the proposals would not obscure views of the more elevated parts of the landscape. The magnitude of visual impact is deemed Medium-Low. Whilst the influence of urban development in views to the south, is considered adverse in its quality, views would be influenced by the open space proposals, and the extensive planting undertaken in connection with Oldcourt Park and the residential areas, which would enhance the quality and condition of the landscape, and the character of views. The quality of the effects are considered to be neutral but tend towards negative. It is noted that the intervening landscape may be subject to infill development as a result of the realignment of the ESB power cable wayleave.	
7	Viewpoint 7 is taken from Ely Close, and is representative of views experienced by residential receptors (albeit subject to variation as a result of property orientation). Views towards the site are restricted by successional belts of vegetation present in the intervening landscape.	Medium-Lo	Visibility of the site and the proposed development will be restricted by vegetation present in the intervening landscape. As with VPs 5 and 6, any seasonally increased degree of visibility will be marginal given the density of vegetation. Given the degree of screening, and the context of views, the change to views would be modest, and would not notably alter the character and composition of views, which would remain strongly influenced by views to the upland landscape to the south. The magnitude of visual impact is deemed Medium-Low. The quality of the effects are considered to be neutral.	Slight Neutral Permanent
8	Viewpoint 8 is taken from Allenton Drive and is representative of views	Medium-lov	Visibility of the site and the proposed development will be	Slight Neutral Permanent

	experienced by residential receptors (albeit subject to variation as a result of property orientation) and road users. Views towards the site are restricted by successional belts of vegetation present in the intervening landscape, as well as fencing and netting associated with the adjoining St. Anne's GAA Club.		restricted by features and vegetation present in the intervening landscape. As with VPs 5 to 7, any seasonally increased degree of visibility will be marginal given the density of vegetation. Views of the northernmost part of the development would be visible as part of the backdrop to the GAA club, albeit seen partially and as part of a wider residential context. Given the degree of screening, and the context of views, the change to views would be modest, and would not notably alter the character and composition of views, which would remain strongly influenced by views to the upland landscape to the south. The magnitude of visual impact is deemed Medium-Low. The quality of the effects are considered to be neutral.	
Vp	**Existing view**	**Sensitivity**	**Magnitude**	**Level of Effect**
9	Viewpoint 9 is taken from junction of Allenton Avenue and Allenton Park. It is representative of views experienced by residential receptors (albeit subject to variation as a result of property orientation) and users of the open space. Views towards the site are restricted by successional belts of vegetation present in the intervening landscape.	Medium-lov	Built form and vegetation in the intervening townscape will preclude any potential views of the proposed development. The magnitude of visual impact is deemed Negligible. The proposed development would not improve or detract from views, and as such effects are considered neutral.	Imperceptible Neutral Permanent
10	Viewpoint 10 is taken from junction of Ellensborough Rise and Kiltipper Road. It is representative of views experienced by residential	Medium-lov	The proposed development would be partially visible in views to the east, where it would be seen as part of a wider urban context, that is influenced by the	Slight - Imperceptible Neutral Permanent

	receptors in the wider townscape (albeit subject to variation as a result of property orientation) and road users on Kiltipper Road. Given the degree of elevation, longer range views are available over the wider urban context, and upland landscape.		large scale overhead power cables infrastructure. Given the degree of visibility, and the influence of distance, the proposed development would generate minimal change to the view and would not be readily discernible. The magnitude of visual impact is deemed Low tending to Negligible. The proposed development would not improve or detract from views, and as such effects are considered neutral.	
11	Viewpoint 11 is taken from Ballymana Lane. It is representative of views experienced by scattered residential receptors in the wider rural landscape to the south of the main urban area (albeit subject to variation as a result of property orientation) and visual receptors in this comparatively elevated part of the landscape to the west of the site which affords longer range views over the wider landscape.	Medium	The proposed development would be visible in middle-long range views to the northeast, where it would be seen as a small part of the urban fringe in expansive views over the wider Dublin cityscape. Given the distance and the expansive nature of the views, and other more prominent features in the view, such as Howth Head and Lambay Island, and the mountainous landscape of the Dublin Mountains, the proposed development would generate minimal change to the view and would not be readily discernible. The magnitude of visual impact is deemed Low tending to Negligible. The proposed development would not improve or detract from views, and as such effects are considered neutral.	Slight - Imperceptible Neutral Permanent
12	Viewpoint 12 is taken from Bohernabreena Road at the entrance to the Cemetery. It is representative of views experienced by road users, and visitors to the cemetery at the main point of arrival. Views towards the site are influenced by boundary walling along the frontage of the cemetery.	Medium-lov	The proposed development would be partially visible in short range views to the north east where the roofline would be seen above the cemetery boundary wall. Given the degree of screening, and the built context of views from Bohernabreena Road, the change to views would be modest, and would not notably alter the character and composition of views. The	Moderate-Slight Neutral - Positive Permanent

			magnitude of visual impact is deemed Medium-Low. The proposed development is not considered to notably improve, nor detract from views, albeit the presence of new residential properties is considered to offer a more positive influence on views from this location than the existing industrial units. The quality of the effects are considered to be neutral but tend towards positive.	
13	Viewpoint 13 is taken from Bohernabreena Cemetery at a central location within the car park. It is representative of views experienced by visitors to the cemetery. Views towards the site are influenced by boundary walling and intervening vegetation outwith the cemetery boundaries, and a wider urban backdrop.	Medium	The eastern part of the proposed development would be visible in short range views to the north where it would be seen rising above the cemetery boundary wall for the entire length of the cemetery. Views of the western part of the development are precluded by vegetation along the western edge of the cemetery. Winter leaf loss may increase the degree of visibility of the western part of the proposed development, albeit the density of this vegetation would mean that this seasonally increased visibility is marginal. Whilst the character of the view would change as a result of the type of development visible, it would not be notable in terms of the scale of development relative to the previously urban backdrop and would not notably alter the overall composition of the view. The magnitude of visual impact is deemed Medium-Low. Views of new residential properties is considered a more positive influence on views from the cemetery than the existing industrial units. The quality of the effects are considered to be positive.	Moderate - Slight Positive Permanent
Vp	Existing view	Sensitivity	**Magnitude**	**Level of Effect**

14	Viewpoint 14 is taken from McMahon's Lane at a gap between the properties that allows views towards the site. The viewpoint is representative of views experienced by users of this rural road, and (to a lesser extent) of views experienced by residents in properties adjoining it (noting that some residential receptors will obtain clearer views within their properties.	Medium	The proposed development would be partially visible in short-middle range views to the north east, where it would be seen as part of the foreground to the wider Dublin cityscape beyond. Whilst visible, given the extent of the view affected, it is not considered that the proposed development would notably alter the character or composition of the view. The magnitude of visual impact is deemed Low. The proposed development is not considered to notably improve, nor detract from views, albeit the presence of new residential properties is considered to offer a more positive influence on views from this location than the existing industrial units. The quality of the effects are considered to be neutral but tend towards positive.	Slight Neutral - Positive Permanent
15	Viewpoint 15 is taken from Conroy's Lane. It is representative of views experienced by scattered residential receptors in the wider rural landscape to the south of the site (albeit subject to variation as a result of property orientation). Expansive views north over the wider urban landscape are afforded to which the site forms part of the foreground.	Medium	The proposed development would be visible in short-middle range views to the north, where it would be seen as part of the urban fringe in expansive views over the wider Dublin cityscape. Visibility of the site and the proposed development would be restricted by belts of retained vegetation present in the intervening landscape, and whilst winter leaf loss may increase the degree of visibility, the density of this vegetation in combination with new planting will mean that this seasonally increased visibility is marginal. Whilst the development would be visible through and above this existing vegetation, as part of the foreground to views over the wider Dublin cityscape, it would not notably alter the character or composition of the view, given the elevation and the expansive nature of the views over the wider urban context. The magnitude of visual impact is deemed Medium-Low. Whilst the influence of the proposed development in views	Moderate-Slight Neutral - Positive Permanent

			to the north would not notably improve or detract from views, the development, together with the planting proposed, is considered to contribute towards a more rounded and less fragmented settlement edge, with a treed character that ties in more sympathetically with the remaining agricultural slopes. As such, the quality of the effects are considered to be neutral but tending towards positive.	
16	Viewpoint 16 is taken from 'Forest Loop' trail, Hell Fire Club & Massy's Estate. It is representative of views that would experienced by recreational receptors in this elevated part of the landscape, with expansive views north over the wider urban landscape.	Medium	The degree to which the development would be visible, and impact views from this location would be comparable to that described at VP15, albeit with increased distance and elevation views of the development would become more marginal. At this location the change to the view as a result of the development would not be readily noticeable. The wider urban context, and prominent features of the view, such as Howth Head and Lambay Island would prevail in their influence, and the magnitude of visual impact is deemed Low. Again, the proposed development would not notably improve or detract from views, but is considered to offer a more rounded and less fragmented settlement edge, with a treed character that ties in more sympathetically with the remaining agricultural slopes. As such, the quality of the effects are considered to be neutral but tending towards positive.	Slight Neutral - Positive Permanent

Table 15.7 – Visual Impact Assessment

It is noted that at proximate viewpoints 2, 5, and 6, the change to the view, and the resulting visual effects should be considered in the context that additional infill development may come forward in the intervening landscape as a result of the realignment of the ESB power cable wayleave. This would influence views from these locations given their proximity, and would substantively preclude views of the proposed development. Whilst also visible from other viewpoints, this infill development would have a more marginal influence.

Given the comparative elevation, and the presence of built form in the wider urban area to the north of the site, views from the urban area are generally limited to those available from edge locations. In this context, layers of vegetation and other elements in the intervening landscape act to restrict visibility such that it would generally only be seen partially and as part of a wider urban edge residential context. Whilst winter conditions may act to marginally increase visibility, given the density of the vegetation, any views would remain heavily filtered.

It is recognised that an important aspect of views from the urban area, is the backdrop of the Dublin Mountains and that the site forms part of the lower slopes in that regard. From the existing urban edge, whilst the proposed development would be visible (to varying degrees), it would not obscure views of the more elevated parts of the landscape, nor notably alter the character and composition of views which would remain strongly influenced by them.

It is also acknowledged that the site would be visible from more remote and elevated parts of the landscape where it would be seen as part of the urban fringe in expansive views over the wider Dublin cityscape. Whilst the development would be visible it would not notably alter the character or composition of the views, which would remain strongly influenced by the foreground agricultural slopes, and expansive long-range views.

The nature of the change brought about by the proposed development is deemed to be modest, and consistent with the immediate urban context. Whilst the influence of urban development in views over a comparatively undeveloped part of the landscape is considered adverse, the development is considered to be consistent with the immediate urban context and would maintain a visual relationship with the elevated landscape. With maturity, planting would improve the density and character of the belt of intervening vegetation.

The most notable visual impacts occur in relation to visual receptors (residents) in the immediate urban area to whom the proposals will invariably result in an intensification of urban development in views. However, although potentially noticeable, the proposed development will only influence a small part of the view, and will not significantly influence the character or composition of views, or visual amenity in the context of this heavily modified urban edge environment in which many other comparable built features are present.

As a result, the proposed development is considered to have the potential to generate visual effects that are Moderate-slight only. These effects relate to the immediate locality of the site, beyond which effects would be no greater than Slight. Effects were generally identified as being of neutral quality. These tended towards negative in relation to adjoining residential receptors where the development would influence the immediate pastoral foothill context but tended towards positive in other locations where the development would contribute to a more rounded and less fragmented settlement edge, with a treed character that ties in more sympathetically with the remaining agricultural slopes.

15.8. Mitigation Measures

The proposed development forms an extension of the existing urban area and is considered to be comparable with other recently developed (and under construction) residential schemes in the locality. Given this context, beyond good residential development design, it is not considered that there are any notable design changes that would moderate effects further.

All mitigation relating to the layout and architectural character of the proposals have been embedded within the proposals as part of an iterative and consultative design approach, ensuring that careful

consideration has been given to the receiving landscape. In this regard, the 'residual' effects will be no different to those described in the main body of the assessment.

15.8.1 Construction Phase

It is not considered that there are any additional mitigation measures required to reduce the anticipated construction phase landscape / visual effects over those that would be considered standard best practice construction management measures. It is anticipated that this may include aspects such as the timing of construction activities, which will be restricted in accordance with local authority guidance, and will likely be consistent with those enforced on nearby sites.

Effects during construction are an inevitable consequence of the development and are likely to be consistent with those enforced on nearby sites.

15.8.2 Operational Phase

Landscape and urban design measures are integral to the development proposals being assessed and will help to assimilate built form within its surrounding context in a general sense whilst contributing to the character and quality of the development.

Particular consideration has been made to the sloping nature of the site, with the development typology responding to more elevated parts of the site. The layout of the development has also sought to work with the framework of existing vegetation as far as practicable, augmenting this with additional planting. Whilst new planting is important to the character of the development, and will enhance the quality of the effects, it is not a case that its establishment will result in materially different impact judgements before and after landscape planting becomes established.

In this regard, other than those features and characteristics of the development proposals that have been embedded into the design of the scheme, there are no additional landscape and visual mitigation measures considered necessary in this instance.

15.8.3 Monitoring or Reinstatement Measures

Landscape tender drawings and specifications will be produced to ensure that the landscape work is implemented in accordance with best practice. This document will include tree work procedures, soil handling, planting and maintenance. All landscape and planting works will be undertaken as soon as practicable in the planting season after completion of key civil engineering and building works, and supervised by a suitably qualified Landscape Architect Clerk of Works.

All landscape works will be subject to an establishment phase following planting, with replacement plant material and required pruning measures captured in Landscape Management Plans (LMPs). LMPs are intrinsically linked to the successful establishment of landscape and visual mitigation measures.

Prior to the completion of the landscape works, a competent landscape contractor will be engaged and a detailed maintenance plan, scope of operation and methodology will be put in place to ensure the successful long-term establishment of all external landscape areas.

Management and maintenance operations are inherently related to the continued appearance of the development and the establishment of planting and will include general management and maintenance measures (mowing, litter picking etc.), as well as measures such as weed control, replacement planting, formative pruning etc.

Whilst plant failures can be an unfortunate reality on development sites, many of these can be readily attributed to site, plant material, or contractor issues, and can be readily corrected. Holistic and widespread failure of plant material and other external landscape works is unlikely and is not in the commercial interests of developers and contractors.

15.9. 'Do nothing' Scenario

The 'do nothing' impact presents the situation or environment that would exist if the Proposed Development were not carried out. The invariable consequence of this would be that the impacts and effects identified would not occur. In this regard, the following key scenarios are considered relevant.

The current land use of the subject site is not a land use which is likely to persist in the longer term due to the current residential zoning, and the immediacy of other development projects. In the event that the development does not proceed, it is likely that the subject site will be developed in the future for some residential and open space use.

If the site is left in its current state as agricultural land use, the management of the fields and hedgerows will be likely to continue in its current manner and hence a neutral impact will persist on the existing landscape.

15.9.1 'Worst-Case' Effects

The 'worst-case' effects arise when the mitigation measures (as proposed) substantially fail. In the case of this development, various measures of relevance to moderating landscape and visual effects have been incorporated within the layout proposed, and include considerations relating to layout, scale and disposition of development around the site. The worst-case landscape and visual effects are therefore considered to relate primarily to the failure of planting proposed around the site.

The assessment provides judgements based on vegetation being in a relatively immature form, and as stated previously, it is not considered that the establishment of vegetation planted as part of the development will result in materially different impact judgements before and after landscape planting becomes established. As such, the effects presented should be considered worst case.

15.10. Residual Effects of the Proposed Development

As described, landscape and visual measures, have been integrated into the proposals on which the main assessment is made. In this regard, the 'residual' effects will be no different to those described in the main body of the assessment. For the purposes of this section, the judgements that reflect the situation once vegetation has become mature are summarised, these reflecting the long-term effects of the proposed development.

15.10.1 Construction Phase

Construction phase impacts are an inevitable consequence of the proposed development and are considered to be Short-term tending to Medium term.

Landscape

Construction stage landscape impacts are deemed to be no greater than Moderate within the immediate surroundings of the site, reducing to Moderate-Slight within the wider study area. The quality of the construction stage visual effects will be Negative.

Construction Phase landscape effects are not considered to be significant.

Visual

Construction stage visual impacts are deemed to be no greater than Moderate, reducing to Moderate-Slight within the wider study area. The quality of the construction stage visual effects will be Negative.

Construction Phase visual effects are not considered to be significant.

15.10.2 Operational Phase

Landscape

Operational stage landscape impacts are deemed to be no greater than Moderate within the immediate surroundings of the site, reducing to Moderate-Slight within the wider study area. The quality of the operational stage landscape effects will be Positive.

Operational Phase landscape effects are not considered to be significant.

Visual

Operational stage visual impacts are deemed to be of no greater than Moderate-slight within the immediate surroundings of the site, reducing to Slight within the wider study area. The quality of the operational stage visual effects will be Positive or Neutral where views are influenced more marginally.

Operational Phase visual effects are not considered to be significant.

15.11. Cumulative Impacts of the Proposed Development

Within a cumulative assessment, the baseline against which landscape and visual effects are assessed is extended to consider other relevant schemes that are not currently present but that are subject to a valid planning application (or have been permitted) as being operational. Cumulative effects therefore represent any increased or 'additional' effects that may be generated by the development in a scenario where other relevant schemes in the locality are present.

In accordance with GLVIA3, schemes that are at feasibility and pre-planning are not generally considered to be appropriate in the context of a cumulative assessment due to a lack of certainty that they will come forward and because of an absence of detail that enable any meaningful judgements to be made. The cumulative assessment follows the same process with the exception that the baseline is extended to assume this development is built and present in the baseline view.

Whilst there are numerous domestic scale applications across the wider study area, no comparable strategic scale developments have been identified. Domestic scale developments are synonymous with a constantly evolving townscape and are not considered entirely relevant to a consideration of cumulative landscape and visual effects relative to a development proposal of this scale and extent.

Located on the south Dublin suburban edge, the application site forms part of the southward expansion of the urban area and part of a landscape that has been influenced by ongoing change. Effects arising as a result of the proposed development in a cumulative scenario that includes other urban edge residential development as being present are considered to be consistent with the effects reported in the main body

of the LVIA. The development would always form part of the urban edge and would be influenced by the relationship between the wider urban area and the wider landscape of the Dublin Hills to the south.

The proposed development is not considered to have the potential to generate any significant cumulative landscape or visual effects, and cumulative effects are not considered further.

15.12. Interactions and Interrelationships

Various characteristics and activities associated with the proposed development during construction and operation will generate impacts on the landscape and visual environment, as well as other environmental impacts addressed in different chapters of the EIAR.

This section considers the interaction between the identified landscape and visual effects and those identified within various other chapters, albeit it is noted that the findings of the LVIA did not identify any significant impacts, and many impacts identified in other topic areas are mitigated through measures outlined in the CEMP, or other mitigation measures outlined. The main interaction is considered to be with Population and Human Health.

Landscape and Visual Impact / Population and Human Health

Visual impacts arising from the proposed development are considered in the LVIA with respect to the effect on views and on the general visual amenity experienced by people, including local residents. The operational effects are given a proportionate degree of focus given the long-term nature of the change. However, whilst the proposed development has the potential to be visible, it will be seen in the context of a heavily modified and evolving peri-urban/urban landscape, and it is noted that the findings of the assessment did not identify any significant impacts in relation to visual receptors. The findings of the LVIA have contributed to the Population and Human Health assessment.

Whilst the development will be visible to nearby receptors, such a transformation is a zoned objective for the site, and the proposed development is considered to represent a high-quality urban intervention that assimilates sensitively with its wider landscape and visual setting. Consideration has been given to the integration of high-quality open space, and to planting that will moderate the visual impact of the proposals and reinforce the framework of vegetation present in the wider landscape.

15.13. Summary

It is important to appreciate that effects on landscape character and visual amenity are an inevitable consequence of any development proposal of this type given the change in land use, and given the proximity and variety of visual receptors.

In arriving at the design for the proposed development, consideration has been given to the sloping nature of the site, the existing green infrastructure, and existing wayleaves, with the housing typology responding to elevation. The development is therefore considered to respond sensitively to the site's topography and location at the foothills of the Dublin Mountains, to the characteristics and qualities that underpin this landscape, and to visual receptors for which the proposed development would generate change in their visual environment.

The wider urban edge has accommodated numerous housing projects, that have gradually expanded the wider townscape in line with the strategic direction for this part of the administrative area. The proposed development of this site is not considered to have the potential to generate any operational landscape or visual effects greater than Moderate, and no effects are considered to have the potential to be significant.

The most notable landscape and visual effects relate to a relatively geographically restricted area, with effects reducing significantly with distance and elevation, as the proposed development becomes a proportionately smaller component of the urban edge.

The proposed development, together with any infill schemes that arise as a result of the realignment of the ESB Power cable, is considered to have the potential to form a positive addition to the urban edge in this direction.

NOTE: This LVIA should be read in conjunction with the Visually Verified Montages (VVM) submitted separately as part of the planning application, which illustrates how the proposed development would appear from a variety of locations in the surrounding landscape

16.0. Identification of Significant Impacts / Interactions

16.1. Identification of Significant Effects

The purpose of this section of the EIAR is to draw attention to significant interaction and interdependencies in the existing environment. In preparing the EIAR, each of the specialist consultants have and will continue to liaise with each other and will consider the likely interactions between effects predicted as a result of the proposed development during the preparation of the proposals for the subject site and this ensures that mitigation measures are incorporated into the design process.

This approach is considered to meet with the requirements of Part X of the Planning and Development Act 2000 and Part 10, and schedules 5, 6 and 7 of the Planning and Development Regulations 2001 (as amended). The detail in relation to interactions between environmental factors will be covered in each chapter of the EIAR.

All environmental factors are interlinked to a degree such that interrelationships exist on numerous levels. Interactions within the study area can be one-way interactions, two-way interactions and multiple-phase interactions which can be influenced by the proposed development. As this EIAR document has been prepared by a number of specialist consultants, an important aspect of the EIA process is to ensure that interactions between the various disciplines have been taken into consideration. This chapter of the EIAR was prepared by Tracy Armstrong, $^{BA, MRUP, MIPI, MRTPI}$, Planning Consultant of Armstrong Fenton Associates.

All of the potential significant effects of the proposed development and the measures proposed to mitigate them have been outlined in the preceding chapters of this EIAR. However, for any development with the potential for significant environmental effects, there is also the potential for interaction amongst these potential significant effects. The result of interactive effects may exacerbate the magnitude of the effects or ameliorate them or have a neutral effect.

The purpose of this requirement of an EIAR is to draw attention to significant interaction and interrelationships in the existing environment. Armstrong Fenton Associates Planning Consultants, in preparing and co-ordinating this EIAR ensured that each of the specialist consultants liaised with each other and dealt with the likely interactions between effects predicted as a result of the proposed development during the preparation of the proposals for the subject and ensuring that appropriate mitigation measures are incorporated into the design process.

Having regard to the approach taken, the aspects of the environment likely to be significantly affected by the proposed development, during both the construction and operational phases, have been considered in detail in the relevant Chapters of this EIAR document. In addition, likely interactions between one topic and another have been discussed, where relevant, by the relevant specialist consultant(s).

The primary interactions can be summarised as follows:

- Noise, air, waste, water and traffic with population and human health;
- Land and soils with traffic, water, resource management, noise, air and biodiversity;
- Water with biodiversity;
- Waste with biodiversity;
- Cultural heritage and the landscape and
- Air quality and climate and traffic.

Where there are identified associated and inter-related potential likely and significant impacts which are more comprehensively addressed elsewhere in this EIAR document, these are referred to.

However, the reader is directed to the relevant environmental topic chapter of this EIAR document for a more detailed assessment.

During the Operational Phase, it is anticipated that water and traffic will be the key environmental factors impacting upon population and human health as a new residential landscape will be created. The increase in population will result in increased traffic and increased demands on water supply and increased requirements for wastewater treatment. These are addressed in the appropriate sections of this EIAR.

The relevant consultants liaised with each other and the project architects, engineers and landscape architects, where necessary, to review the proposed scheme and incorporate suitable mitigation measures, where necessary. As demonstrated throughout this EIAR, most inter-relationships are neutral in impact when the mitigation measures proposed are incorporated into the design, construction or operation of the proposed development.

Where appropriate, the relevant impact areas are considered in grouped form, as set out below.

16.2. mpact Interactions

Where any potential negative effects have been identified during the assessment process, these impacts have been avoided by design or reduced by the proposed mitigation measures.

Table 16.1 overleaf provides a summary of the potential interactions anticipated from the proposed development.

Subject	Interaction With:	Interactions / Inter-Relationships
Population & Human Health	**Air Quality**	The completed development will generate additional emissions to the atmosphere associated with the development, and due to any required plant equipment within the development. However, air quality in the region of the site is expected to be within the limits set by the air quality standard. During construction there may be potential for slight dust nuisance in the immediate vicinity of the site. However, dust control measures, which include a range of measures such as wheel washes and covering of fine materials will minimise the impact on air quality. A dust management plan will be formulated for the site. The effect of construction on air quality will not be significant following the implementation of the proposed mitigation measures. It is proposed to adhere to good working practices and dust mitigation measures to ensure that the levels of dust generated will be minimal and are unlikely to cause an environmental nuisance. There is no significant impact from dust once the development is completed. Overall, it is envisaged that the proposed development will not have a significant impact on air quality.
Population & Human Health	**Noise**	The greatest potential for noise and vibration impact arising from the proposed development will be in the construction phase. However, following the implementation of the proposed mitigation measures in relation to noise, the impact associated with the construction phase of the proposed development is predicted to be temporary and intermittent in nature. No significant impacts on the local noise and vibration climate are predicted during the operational phase of the proposed development.
Air Quality	**Soils**	Exposed soil during the construction phase of the proposed development may give rise to increased dust emissions. However, the implementation of a dust management plan and dust control measures will ensure that the proposed development will not give rise to the generation of any significant quantities of dust.
Material Assets	**Air Quality**	The proposed development is located in a suburban area. However, mitigation measures for dust control and dust suppression can keep the potential for dust to impact upon neighbouring properties in the Ballycullen / Oldcourt area very low.

Subject	Interaction With:	Interactions / Inter-Relationships
Water	**Biodiversity**	During the construction phase, surface water quality would be protected through the implementation of mitigation measures, which include the regular maintenance and inspection of construction plant, the appropriate storage of potentially polluting substances and the supervision of all concrete works. Therefore, no potential significant impacts upon water quality are anticipated during the construction phase. There would be no potential impacts to water quality during the operational phase of the development.
Material Assets – Resource & Waste Management	**Water**	Should waste be incorrectly handled or stored at the development site during construction works, it has the potential to cause an adverse impact upon water quality in the area through leaching of materials to groundwater or surface water. However, waste is to be segregated and stored in suitably contained waste receptacles at the site compound, considerably reducing the potential risk of pollution to water. It is not considered that there would be any significant risk to water quality as a result of waste management during the operational phase, given that waste would be collected by private, licenced waste contractors and recovered, recycled or disposed of at appropriately licenced waste facilities, which would have environmental controls in place as standard.
Material Assets - Waste	**Biodiversity**	Waste has the potential to impact upon biodiversity during the construction phase, by causing pollution to soils and water and by potentially attracting pests / vermin to the site. However, wastes would be stored in suitably contained waste receptacles at the site compound, reducing the potential of pollution to soils and water. Furthermore, the majority of wastes generated during the construction phase would be inert materials, which would reduce the potential for issues regarding pests / vermin. It is not considered that there would be any significant impact upon biodiversity due to waste management during the operational phase, given that waste would be collected by licenced waste contractors and recovered, recycled or disposed of at appropriately licenced waste facilities, which would have environmental controls in place as standard.

Subject	Interaction With:	Interactions / Inter-Relationships
Material Assets – Resource & Waste Management	**Human Beings**	Should waste be incorrectly handled or stored at the development site, it has the potential to cause an adverse impact upon human beings through nuisance, including visual, odour and pests, and pollution to soils and water. It should also be noted that given the inert nature of the majority of C&D waste types, it is unlikely that issues regarding odour or pests would arise. During the operational phase, suitably contained wheelie bins / waste receptacles would be provided to the residential area, commercial and community use facilities by private waste contractors, thus there would be no significant risk of pollution to soils. Waste would be collected on a regular basis, typically on a two-weekly basis alternating between recyclables and municipal waste. Therefore, waste would not be envisaged to accumulate to high enough volumes to cause nuisance.
Material Assets – Resource & Waste Management	**Landscape**	Waste and litter have the potential to adversely affect the appearance of the landscape. However, as waste management measures would be implemented as part of the proposed development, it is considered that there would be no significant adverse impact upon the landscape.
Air, Population and Human Health	**Biodiversity**	An adverse impact on air quality has the potential to impact upon human health, cause dust nuisance and cause disturbance to fauna. However, the risk to air quality as a result of the proposed development would not be considered significant, both at the local community level and on a broader national / global scale. During the construction phase of the development, there would be potential for dust emissions, which could impact upon the communities and residents on the roads to the site and fauna in the immediate envionrs. The potential impact of dust would be temporary, given the transient nature of construction works. Dust control would be an integral part of construction management practices, with mitigation measures implemented where required, including sweeping of roads and hardstand areas, appropriate storage and transport of material and dust suppression measures where required. It should be noted that an important interaction exists between air quality and flora, whereby vegetation can play an important role in acting as an air purifier by absorbing carbon dioxide and giving out oxygen. It would therefore be anticipated that potential carbon dioxide emissions generated by home heating systems and discharged from vehicle exhausts would be somewhat mitigated by vegetation in the environs of the site.

Subject	Interaction With:	Interactions / Inter-Relationships
Air & Climate	**Surface Water / Groundwater**	The interactions between Air & Climate and surface water and groundwater will be mainly limited to the construction phase and are mitigated by the drainage design and proposed mitigation measures.
Air Quality	**Biodiversity**	An increase in dust emissions during the construction phase has the potential to adversely impact upon flora by blocking leaf stomata, interfering with photosynthesis, respiration and transpiration processes. However, given the transient nature of construction works, and given that standard dust control measures would be implemented, no significant impact would be anticipated.
Air & Climate	**Biodiversity**	During construction there are potential issues for biodiversity if the trees in the surrounding area were to be covered in dust during construction. However, this will be mitigated by the implementation of a proposed dust minimisation plan and then there should be no impacts on nearby trees.
Noise	**Population and Human Health/Biodiversity**	Increased noise levels during the construction phase will be temporary only and are not expected to have a long-term significant adverse effect upon Population and Human Health in the general area. Furthermore, the application of binding noise limits and hours of operation, along with the implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum. There will be no significant increase in ambient noise levels arising during the operational phase of the proposed development. Noise generated during the construction and operational phases of the proposed development has the potential to impact upon Population and Human Health and fauna within the vicinity of the site. During the construction phase, noise may be generated due to increased vehicle movements and the operation of construction plant. It is anticipated that there would be a moderate impact, for limited periods of time, on the nearest local residences and fauna within the vicinity of the development. Control and mitigation measures would be implemented to reduce noise and vibration, including measures relating to equipment operation and timing of activities. Given the transient nature of construction works, and provided mitigation measures are implemented, noise from construction would not be considered to pose a significant impact upon human beings or biodiversity.

Subject	Interaction With:	Interactions / Inter-Relationships
Landscape	**Population and Human Health**	Changes to the landscape character of the site itself will include the development of new buildings and associated landscape. The landscape and visual impact associated with Population and Human Health focuses on the effects to dwellings. The settlement pattern comprises residential development to the north and east, with Firhouse located c.1.5km to the north-east and Tallaght town centre located c.2.5km to the north-west. The proposed development generates visual effects, and the effects and associated amelioration of these effects is discussed in the impact section of the chapter.
Landscape	**Biodiversity**	The long-term effects of the proposed development will have a positive effect on the provision of landscaped areas associated with the development, through the creation of a new bio-retention park, new c.2.3Ha Oldcourt Park protection of wetlands, and protection and retention of hedgerows. Further consultation with the Ecological Consultant will take place at implementation and monitoring stages to ensure adherence to best practice and sound ecological principles.
Surface Water / Groundwater	**Soils/Geology/Waste Management**	There is a close link between soils & geology and water (hydrogeology and hydrology). For example, surface water runoff during the construction phase may contain increased silt levels (e.g. runoff across areas stripped of hardstanding). Impacts on the geological environment include stripping of topsoil which will result in exposure of the underlying subsoil layers to the effects of weather and construction traffic and may result in subsoil erosion and generation of sediment laden runoff. Waste Management and dust management is also considered in interactions as soil removal will be required for this development. Interactions between soils/geology will be mainly limited to the construction phase due to material excavation.
Material Assets - Utilities	**Material Assets - Waste Management, and Water (hydrogeology)**	The proposed works result in an increase in surface water runoff, if not catered for adequately this may have an effect on the hydrogeology.

Subject	Interaction With:	Interactions / Inter-Relationships
Material Assets – Resource & Waste Management	**Traffic and Transportation/ Soils and Geology**	Waste management interacts with traffic and transportation, soils and geology. The direct and indirect effects of waste-related transport are considered in Chapter 12, Traffic and Transportation and the geotechnical characterisation of the scheme is considered in Chapter 6 – Land and Soils.
Material Assets – Traffic	**Population and Human Health**	Temporary negative impacts to human health may be likely during the construction phase due to noise, dust, air quality and visual impacts which are discussed in other chapters within this EIAR. The traffic impacts, which would also be temporary in duration are not considered to be significant due to the implementation of the mitigation measures identified.
Air & Climate	**Surface Water / Groundwater**	The interactions between Air & Climate and surface water and groundwater will be mainly limited to the construction phase and are mitigated by the drainage design and proposed mitigation measures.
Air Quality	**Biodiversity**	An increase in dust emissions during the construction phase has the potential to adversely impact upon flora by blocking leaf stomata, interfering with photosynthesis, respiration and transpiration processes. However, given the transient nature of construction works, and given that standard dust control measures would be implemented, no significant impact would be anticipated.
Air & Climate	**Biodiversity**	During construction there are potential issues for biodiversity if the trees in the surrounding area were to be covered in dust during construction. However, this will be mitigated by the implementation of a proposed dust minimisation plan and then there should be no impacts on nearby trees.

Subject	Interaction With:	Interactions / Inter-Relationships
Noise	**Population and Human Health/Biodiversity**	Increased noise levels during the construction phase will be temporary only and are not expected to have a long-term significant adverse effect upon Population and Human Health in the general area. Furthermore, the application of binding noise limits and hours of operation, along with the implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum. There will be no significant increase in ambient noise levels arising during the operational phase of the proposed development. Noise generated during the construction and operational phases of the proposed development has the potential to impact upon Population and Human Health and fauna within the vicinity of the site. During the construction phase, noise may be generated due to increased vehicle movements and the operation of construction plant. It is anticipated that there would be a moderate impact, for limited periods of time, on the nearest local residences and fauna within the vicinity of the development. Control and mitigation measures would be implemented to reduce noise and vibration, including measures relating to equipment operation and timing of activities. Given the transient nature of construction works, and provided mitigation measures are implemented, noise from construction would not be considered to pose a significant impact upon human beings or biodiversity.

Subject	Interaction With:	Interactions / Inter-Relationships
Landscape	**Population and Human Health**	Changes to the landscape character of the site itself will include the development of new buildings and associated landscape. The landscape and visual impact associated with Population and Human Health focuses on the effects to dwellings. The settlement pattern comprises residential development to the north, with the Firhouse centre located to the north-east and Tallaght town centre to the north-west. The proposed development generates visual effects, and the effects and associated amelioration of these effects is discussed in the impact section of the chapter.
Landscape	**Biodiversity**	The long-term effects of the proposed development will have a positive effect on the provision of landscaped areas associated with the development, creating pedestrian connections throughout the site to the north, east and west. Hedgerows are in the majority retained and protected as part of the development, save for limited circumstances to allow for the delivery of the east-west main link street. Further consultation with the Ecological Consultant will take place at implementation and monitoring stages to ensure adherence to best practice and sound ecological principles.
Surface Water / Groundwater	**Soils/Geology/Waste Management**	There is a close link between soils & geology and water (hydrogeology and hydrology). For example, surface water runoff during the construction phase may contain increased silt levels (e.g. runoff across areas stripped of hardstanding) Impacts on the geological environment include stripping of topsoil which will result in exposure of the underlying subsoil layers to the effects of weather and construction traffic and may result in subsoil erosion and generation of sediment laden runoff. Waste Management and dust management is also considered in interactions as soil removal will be required for this development. Interactions between soils/geology will be mainly limited to the construction phase due to material excavation.

Subject	Interaction With:	Interactions / Inter-Relationships
Material Assets - Utilities	**Material Assets - Waste Management, and Water (hydrogeology)**	The proposed works result in an increase in surface water runoff, if not catered for adequately this may have an effect on the hydrogeology.
Material Assets – Resource & Waste Management	**Traffic and Transportation/Soils and Geology**	Waste management interacts with traffic and transportation, soils and geology. The direct and indirect effects of waste-related transport are considered in Chapter 12, Traffic and Transportation and the geotechnical characterisation of the scheme is considered in Chapter 6 – Land and Soils.
Material Assets – Traffic	**Population and Human Health**	Temporary negative impacts to human health may be likely during the construction phase due to noise, dust, air quality and visual impacts which are discussed in other chapters within this EIAR. The traffic impacts, which would also be temporary in duration are not considered to be significant due to the implementation of the mitigation measures identified.

Table 16.1 – Summary of Potential Interactions / Inter-relationships

16.2.1 Summary of Interaction of Impacts

Schedule 6 Item 2 (b) of the Planning and Development Regulations, 2001 (as amended) requires that proposed developments are examined with regard to the inter-relationship of aspects referred to in Item 2 (b) of Schedule 6. The matrix incorporated in Table 16.2 overleaf inter-relates the various Chapters of this EIAR to the various impact headings referred to in Schedule 6 Item 2 (b) of the Planning and Development Regulations, 2001 (as amended). The matrix also indicates where these statutory information requirements have been incorporated in this EIAR. It should be emphasised that this matrix does not represent a form of relative assessment of impacts, but merely identifies and amalgamates areas of principal interaction and significance.

Chapter No.	Chapter Headings in EIAR	Interaction of Impacts / Identification of Significant Effects									
		Population & Human Health	Biodiversity	Land & Soils	Water	Air Quality & Climate	Noise & Vibration	Material Assets	Waste Management	Cultural Heritage	Landscape
4	Population & Human Health		✓		✓	✓	✓	✓	✓	✓	✓
5	Biodiversity	✓		✓	✓	✓			✓		✓
6	Land, Soils & Geology		✓		✓	✓	✓	✓	✓		
7	Water	✓	✓	✓				✓	✓		
8	Air Quality & Climate	✓	✓	✓	✓			✓			
9	Noise	✓						✓			
10	Material Assets: Built Services		✓	✓	✓	✓					
11	Material Assets: Transportation	✓		✓	✓	✓	✓		✓		
12	Material Assets: Resource & Waste Management	✓	✓	✓	✓				✓		✓
13	Archaeology & Cultural Heritage	✓									
14	The Landscape	✓	✓						✓		
✓	Area of Principal Interaction										

Table 16.2 – Interactions Matrix

16.3. Other Impacts

15.3.1 Direct and Indirect Effects Resulting from the Use of Natural Resources

Schedule 6 Item 2 (c) of the Planning and Development Regulations, 2001 (as amended) requires that an EIAR contains a description of the likely significant effects (including direct, indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative) of the proposed development on the environment resulting from the use of natural resources. No likely significant effects (including direct, indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative) of the proposed development on the environment are expected to arise from the use of natural resources.

16.3.2 Direct and Indirect Effects Resulting from Emission of Pollutants, Creation of Nuisances and Elimination of Waste

Schedule 6 Item 2 (c) of the Planning and Development Regulations, 2001 (as amended) requires that an EIAR contains a description of the likely significant effects (including direct, indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative) of the proposed development on the environment resulting from the emission of pollutants, the creation of nuisances and the elimination of waste. No likely significant effects on the environment are expected to arise from the emission of pollutants, the creation of nuisances or the elimination of waste.

16.4. Residual Impacts and Cumulative Impacts

Residual impacts can be defined as the final impacts that occur after proposed mitigation measures have taken effect. Many of the findings of the EIA have been incorporated into the design of the development and have contributed to the reduction or amelioration of potential impacts. Where residual impacts arise, they are detailed in the relevant chapters and further mitigation measures detailed where necessary.

Cumulative impacts are defined as: *"The addition of many small impacts to create one larger, more significant, impact"* (EPA 2002). Cumulatively, these impacts may be significant if they occur close together in terms of location and time. The cumulative impact of the proposed development is categorised as neutral and moderate.

As outlined in Chapter 3 this EIAR, where relevant, the EIAR also takes account of other development(s) within the area. These impacts have been addressed in the relevant chapters of the EIAR.

To determine traffic impacts in Chapter 12, the traffic generated by the proposed development is combined with the baseline traffic generated by the traffic on the road network in the area. The potential traffic impacts from other developments were also considered in the assessment (e.g. residential developments - adjacent to the site to the north and east).

Each of the relevant specialists has considered the potential for cumulative impact in preparing their assessments. While there is the potential for negative impacts to occur during the construction stage of the scheme, with the implementation of the appropriate mitigation outlined in the EIAR, the residual cumulative impact is not considered to be significant.

16.5. Environmental Commitments and Mitigation Measures

Mitigation measures to be adopted during the construction and operational phases of the proposed development are detailed within each chapter. These measures should be implemented through planning conditions imposed by the Planning Authority / An Bord Pleanála, as appropriate/necessary.

Mitigation measures will be managed by the contractor(s) as part of the Construction and Environmental Management Plan (CEMP) and Construction Management Plan and by the developer/ landowners thereafter.

16.5.6 Conclusion

This EIAR has regard to and builds on the Strategic Environmental Assessment prepared with the South Dublin County Development Plan 2022-2028.

The EIAR has considered the likely, significant, adverse effects of the proposed project on the receiving environment.

Mitigation measures are included, to avoid and / or reduce impacts on the environment, where considered necessary. This includes mitigation measures incorporated into the design of the proposed development.

The EIAR concludes that there are no material or significant environmental issues arising which were not anticipated by the South Dublin County Development Plan 2022-2028 and considered in its Strategic Environmental Assessments.

17.0. Summary of EIA Mitigation and Monitoring Measures

17.1. Introduction

The central purpose of EIA is to identify potentially significant adverse impacts at the pre-consent stage and to propose measures to mitigate or ameliorate such impacts. This chapter of the EIAR document has been prepared by Armstrong Fenton Associates and sets out a summary of the range of methods described within the individual chapters of this EIAR document which are proposed as mitigation and for monitoring. It is intended that this chapter of the EIAR document will provide a useful and convenient summary to the competent/consent authority of the range of mitigation and monitoring measures proposed, however, full details are set out in the relevant chapters and we refer the reader to same. This chapter of the EIAR was prepared by Tracy Armstrong BA, MRUP, MRTPI, MIPI, of Armstrong Fenton Associates Planning Consultants.

EIA related conditions are normally imposed by the competent/consent authority as part of conditions of planning consent and form a key part of the Impact Anticipation and Avoidance strategy. Conditions are principally used to ensure that undertakings to mitigate are secured by explicitly stating the location, quality, character, duration and timing of the measures to be implemented. A secondary role of EIA related conditions is to ensure that resources e.g. bonds / insurances will be available and properly directed for mitigation, monitoring or remedial action, in the event that the impacts exceed the predicted levels.

Monitoring of the effectiveness of mitigation measures put forward in the EIAR document, both by the competent authorities and the developer, is also an integral part of the process. Monitoring of environmental media and indicators arise either from undertakings or from conditions.

In the case of mitigation and monitoring measures, it is important for all parties to be aware of the administrative, technical, legal and financial burdens that can accompany the measures proposed. It is also important to ensure that, where monitoring is provided for, it is clearly related to thresholds, which, if exceeded, cause a clearly defined set of actions to be implemented.

17.2. Mitigation Strategies

17.2.1 Introduction

There are three established strategies for impact mitigation - avoidance, reduction and remedy. The efficacy of each is directly dependent on the stage in the design process at which environmental considerations are taken into account (i.e. impact avoidance can only be considered at the earliest stage, while remedy may be the only option available to fully designed projects).

17.2.2 Mitigation by Avoidance

Avoidance is generally the fastest, cheapest and most effective form of impact mitigation. Environmental effects and consideration of alternatives have been taken into account at the earliest stage in the project design processes. The consideration of alternatives with respect to the development of the subject lands has been described in Chapter 3.

17.2.3 Mitigation by Reduction

This is a common strategy for dealing with effects which cannot be avoided. It concentrates on the emissions and effects and seeks to limit the exposure of the receptor. It is generally regarded as the *"end of pipe*" approach because it does not seek to affect the source of the problems (as do avoidance strategies above). As such this is regarded as a less sustainable, though still effective, approach.

17.2.4 Reducing the Effect

This strategy seeks to intercept emissions, effects and wastes before they enter the environment. It monitors and controls them so that acceptable standards are not exceeded. Examples include wastewater treatment, filtration of air emissions and noise attenuation measures.

17.2.5 Reducing Exposure to the Impact

This strategy is used for impacts which occur over an extensive and undefined area. Such impacts may include noise, visual impacts or exposure to hazard. The mitigation is effected by installing barriers between the location(s) of likely receptors and source of the impact (e.g. sound barriers, tree screens or security fences).

17.2.6 Mitigation by Remedy

This is a strategy used for dealing with residual impacts which cannot be prevented from entering the environment and causing adverse effects. Remedy serves to improve adverse conditions which exist by carrying out further works which seek to restore the environment to an approximation of its previous condition or a new equilibrium.

17.2.7. Mitigation and Monitoring Measures

The following provides a list, for ease of reference, of the mitigation and monitoring measures recommended in each chapter of the EIAR.

17.2.8. Project Description and Alternatives Examined

Construction Phase

It is envisaged that the development of the lands subject of the proposed development will occur over a seven year period. Given the nature of the project and the need for flexibility to respond to market demand, the development phases are indicative. An Outline/Preliminary Construction Management Plan has been prepared and reviewed by the relevant EIAR consultants and is included as part of this LRD application. A Construction and Environmental Management Plan has been prepared by Enviroguide Consulting which addresses noise and vibration, traffic management, working hours, pollution control, dust control, road cleaning, compound/public health facilities and staff parking associated with the construction works, and is submitted as part of this LRD planning application.

Operational Phase

Not applicable.

Monitoring

Not applicable.

17.2.9. Population and Human Health

17.2.9.1. Mitigation Measures

Construction Phase

Mitigation measures for the Construction Phase are outlined in each of the relevant chapters (No.s 4-15) and are also provided in Chapter 17 "*Summary of EIA Mitigation and Monitoring Measures*". During the Construction Phase a number of mitigating measures should be considered, including *inter alia:*

- Restrict working hours from 07.00 to 19.00 Mondays to Fridays inclusive, between 08.00 to 13.00 on Saturdays. No general works are envisaged to be carried out on Sundays. Should there be a need to work Sundays/Bank Holidays, a written request will be made to SDCC for permission to do so. Any conditions from SDCC relating to out of hours working will be followed including any required notifications to relevant parties;
- Maintain a Traffic Management Plan (TMP) in effect for duration of works;
- The CEMP will be agreed with the Planning Authority upon receipt of planning permission. The construction of the proposed development shall adhere to the relevant provisions of this Plan; and;
- As part of the CEMP, maintain a Dust and Noise abatement plan in operation.

Operational Phase

Where relevant, mitigation measures to address the potential impacts of noise, air traffic etc. on people are included in the appropriate chapters of this EIAR. No likely significant impacts have been identified for population, or land use, accordingly no mitigation measures are required for the Operational Phase.

The proposed development has been designed to avoid significant impacts in relation to local amenities and recreational facilities by:

- Incorporating the provision of a new childcare facility within the design proposal;
- The provision of 73,754.8sq.m (c.7.37 hectares) of public open space which equates to c. 36% of the site area;
- Providing new pedestrian and cyclist links to local amenities and facilities,
- Providing a new east-west road connecting Oldcourt Road to Bohernabreena Road.

Accordingly, no further mitigation measures are required.

17.2.9.2. Monitoring

Measures to monitor potential negative effects on people in respect of noise, air, traffic etc. are included in the following relevant Chapters of this EIAR.

In respect of the impacts assessed above, the contractor will monitor development during the construction phase to ensure compliance with the parameters of the Construction Management Plan. Remedial action will be taken, if required, to ensure construction activities conform to its requirements.

No additional monitoring is proposed for the Operational Phase other than that proposed in other Chapters of this EIAR.

17.3.1. Biodiversity

17.3.1.1 Mitigation Measures

Construction Phase

Protection of Habitats and Flora

Mitigation 1: Site-specific Surface Water Mitigation Measures

While best practice development standards have been included in a Construction and Environmental Management Plan (CEMP) (Enviroguide, 2024b), further details are outlined in this section to ensure the ecology of internal ditches and streams, as well as any downstream watercourses such as the Dodder River are not adversely impacted.

With regards to protecting the existing water features and the water quality of the Dodder, the following measures are recommended following the latest guidance on Construction works in or adjacent to

watercourses (Inland Fisheries Ireland, 2016):

- Silt traps/ponds will not be positioned directly adjacent to the ditches or streams within and adjacent to the Site.
- A buffer zone should remain between any silt trap and any water features (ditches and streams), with natural vegetation left intact. Where natural vegetation within the buffer zone is not an option, imported materials such as terram, straw bales, or coarse to fine gravel should be used either separately or in combination as appropriate.
- Silt fencing will be positioned where required to prevent overland surface water flows over sloped lands to the existing streams and ditches.
- Pre-cast concrete should be preferred over poured concrete to minimise risks for the construction of any headwall features and culverts.
- Any instream works should take place between July-September to avoid any potential risks to downstream fisheries habitats.
- Where temporary storage of imported materials or excavated soils is required on Site, these temporary storage areas will be surrounded with silt fencing to filter out any suspended solids from surface water arising from these materials.
- Under no circumstances will any untreated wastewater generated onsite (from equipment washing, road sweeping etc.) be released into nearby drains.

In addition, the following will be considered when designing fuel, oil and other chemical storage at the Site for the Construction Phase:

- The storage area for fuels, oils and other chemicals will be located as far away from the existing drainage ditches and stream as feasible. This is likely to be located at the northwest area of the Site to minimize potential for any overland flows to existing ditches and streams at the Site or immediately adjacent.

Once the above details are implemented in full together with the best practice measures detailed in the accompanying CEMP (Enviroguide, 2024b), it is considered that no significant adverse impacts on the water quality of the Dodder are likely to occur.

Mitigation 2: Biosecurity Measures

The following best practice site hygiene and biosecurity measures will be in place to avoid spread of the invasive flora identified at the Site into the surrounding areas during Construction Phase and to limit the potential for spread of invasive species at the Site:

- Fencing and signage will be erected to identify and cordon off the areas containing invasive species, until such a time that they are effectively removed.
- All soils/materials being introduced to the Site will be sourced from a certified invasive flora-free source site, to ensure no introduction of invasive plant materials to the Site occurs.
- Personnel working on or between sites will ensure their clothing and footwear are cleaned, ensuring they are visually free from soil and organic debris, in order to prevent inadvertent spread of invasive plant material.
- Where possible tracked vehicles should not be used within an area of infestation, such as within the current industrial area of the Site, until cleared from all invasive floral material as per the prepared ISMP.
- All vehicles containing invasive plant materials for transportation and disposal offsite will be suitably secured with tarpaulins etc., to ensure no inadvertent dissemination of invasive materials en-route.
- Works should be planned to avoid double handling of infected plants materials/soils as far as possible to reduce the risk of spread.
- All vehicles entering or leaving the Site will have been suitably checked and pressure-washed to ensure no introduction of invasive flora to and from the Site. Measures such as a drive through hygiene bath or footbaths will be considered where appropriate, such as for any works within the current industrial area prior to removal of all invasive floral material from the Site.
- Designated wash-down area to ideally be located in the northwestern area of the Site, away from sensitive receptors such as watercourses, ditches, drains etc.
- Material/water left after vehicles have been pressure-washed must be contained, collected and disposed of appropriately (These waters must not under any circumstances be discharged to drains, ditches or watercourses within the Site).
- All chemicals used for the control of non-native species should be stored and used in a responsible manner.

A comprehensive Invasive Species Management Plan shall be prepared prior to beginning of construction to limit the potential for spread of Japanese knotweed and butterfly bush within and outside of the Site. This will involve an updated botanical survey of the Site to ensure accurate mapping of the current extent of any invasive species at the Site.

Mitigation 3: Tree Protection Measures

Protective tree fencing in compliance with BS 5837:2012 'Trees in relation to design, demolition and construction – Recommendations' will be erected prior to any Construction works being undertaken to prevent damage to the canopy and root protection areas of existing trees and hedgerows to be retained at the Site.

The fencing will be signed off by a qualified arborist prior to Construction to ensure it has been properly erected. No ground clearance, earthworks, stock-piling or machinery movement will be undertaken within these areas.

The project Arborist will be instructed **prior to commencement on Site**; to ensure that appropriate tree protection measures are in place. These measures will entail robust fencing around the root protection zones of all trees and hedgerows being retained on Site. An adequate level of signage will also be provided to highlight 'no work zones' and ensure that Site creep and damage to retained habitats does not occur.

Mitigation 4: Construction Phase Lighting

Any night-time lighting required during the Construction Phase for security etc., will be directed away from the boundary vegetation at the Site (i.e., away from hedgerows), and will not be directed skyward.

Lighting will be focused into the centre of the Site and only on equipment and machinery that needs to be illuminated.

The Project Ecologist acting as ECoW for the project will review the Construction Phase lighting with the Contractor regularly during their site visits and make recommendations as required to ensure the lighting is maintained as bat friendly for the duration of the works.

Mitigation 5: Preparation of an Invasive Species Management Plan

A comprehensive Invasive Species Management Plan (ISMP) shall be prepared prior to beginning of construction to limit the potential for spread of Japanese knotweed and butterfly bush within and outside of the Site. Due to the dynamic nature and relatively fast spread of the invasive floral species found at the Site, this measure is included as a mitigation measure in this NIS in anticipation of any time delays between a grant of permission and commencement of works.

Should the commencement of works be delayed beyond 2025, the preparation of the ISMP will require an updated botanical survey of the Site during the botanical growing season, to ensure the current extent of any invasive species at the Site is accurately mapped to inform the ISMP. Should works commence prior to this, it is assumed that the extent of the invasive species would be accurate based on the existing survey data. The ISMP shall be prepared by suitably qualified ecologist/botanist, and signed off by SDCC prior to commencement of works.

The ISMP should at minimum contain the following features:

- Current extent of invasive species on Site;
- Suitable removal methods for each invasive species encountered on Site; and
- Appropriate management of each invasive species encountered on Site.

Protection of Fauna

Mitigation 6: Bat Precautions when Felling Trees

Although all trees on Site set for felling have been assessed and confirmed to be of low-negligible bat roost suitability, harm to individual bats is possible should bats be present during the felling process. It is also possible that trees can become damaged in the time between the original PBRA survey and the tree felling taking place, and this can sometimes increase the bat roost suitability of a tree, providing new roost features e.g., cracks, holes etc.

As such, a pre-felling check will be conducted by a suitably qualified Ecologist of all trees to be felled at the Site prior to felling taking place; to ensure that no changes have occurred and that no individual bats will be harmed. In the unlikely event that a roosting bat is found, no felling of the tree in question will take place and a derogation licence will be obtained from the NPWS to proceed. The Area around the tree will be protected with an appropriate buffer to prevent disturbance of the bat.

It is important to note that permission for the Proposed Development can be granted without any reliance on the potential grant of a derogation licence, and that any references to the potential need to obtain a licence are purely precautionary, as detailed above, and therefore not integral to the decision on whether to grant permission.

Mitigation 7: Vegetation Clearance

As a precaution, a pre-construction badger survey of the Site will be conducted by a suitably qualified Ecologist prior to any clearance of scrub, cutting back of hedgerows taking place; to confirm whether badger have occupied the Site between the time of the mammal survey that informed this Chapter and the commencement of works on Site.

Any demolition works or clearance of vegetation will be carried **out outside the main breeding season**, **i.e., outside of period: 1st March to 31st August,** in compliance with the Wildlife Act 2000. Should any demolition/ vegetation removal be required during this period, this areas to be affected will be checked for birds and nests by a suitable qualified Ecologist, and if any are noted during this evaluation prior to removal, the nest will be protected until the young have fledged as confirmed by the Ecologist, after which time the inactive nest can be destroyed.

To ensure compliance with the Wildlife Act 1976 as amended, the removal of areas of vegetation will not take place within the nesting bird season (March 1st to August 31st inclusive) to ensure that no significant impacts (i.e., nest/egg destruction, harm to juvenile birds) occur as a result of the Proposed Development. Should nesting birds be found, then the area of habitat in question will be noted and suitably protected until the ecologist confirms the young have fledged.

Table 17-1 provides guidance for when vegetation clearance is permissible. Information sources include British Hedgehog Preservation Society's *Hedgehogs and Development* and *The Wildlife (Amendment) Act, 2000*.

The preferred period for vegetation clearance is **within the months of September and October**. Vegetation will be removed in sections working in a consistent direction to prevent entrapment of protected fauna potentially present (e.g., hedgehog). Where this seasonal restriction cannot be observed, a check will be carried out immediately prior to any Site clearance by an appropriately qualified ecologist and repeated as required to ensure compliance with legislative requirements.

Ecological Feature	Month											
	January	February	March	April	May	June	July	August	September	October	November	December
Breeding Birds	Vegetation clearance permissible **(Sept - Feb)**		Nesting bird season. No clearance of vegetation unless confirmed to be devoid of nesting birds by an ecologist. **(Mar - Aug)**						Vegetation clearance permissible **(Sept - Feb)**			
Bats	Tree felling to be avoided unless confirmed to be devoid of bats by an ecologist **(Jan – Aug)**								Preferred period for tree-felling (**late Sept to Nov**)		Tree felling to be avoided unless confirmed to be devoid of bats by an ecologist (**Nov- Dec)**	
Common Lizard	Lizard Hibernation Season No habitat clearance permissible **(Jan – Mar)**			Active period Habitat (scrub, tall sward grass) clearance permissible **(Apr – Oct)**							Lizard Hibernation Season No habitat clearance permissible **(Nov – Dec)**	
Hibernating mammals (e.g., Hedgehog)	Mammal hibernation season. No clearance of vegetation unless confirmed to be devoid of hibernating mammals by an ecologist. **(Jan - Mar)**			Vegetation clearance permissible **(Apr - Oct)**							Mammal hibernation season. No clearance of vegetation unless confirmed to be devoid of hibernating mammals by an ecologist. **(Nov - Dec)**	

Table 17-1. Seasonal restrictions on habitat/vegetation removal for relevant KER species. Red boxes indicate periods when clearance/works are not permissible

Mitigation 8: Construction Site Management for Fauna

As best-practice all construction-related rubbish on Site e.g., plastic sheeting, netting etc. will be kept in a designated area and kept off ground level so as to prevent small mammals such as hedgehogs from entrapment and death.

Trenches/pits must be either covered at the end of each working day or include a means of escape for any animal falling in e.g., a plank or objects placed in the corner of an excavation (Species such as badgers will

continue to use established paths across a site even when construction work has started).

Any temporarily exposed open pipe system will be capped in such a way as to prevent animals gaining access as may happen when contractors are off Site.

Operational Phase

17.3.2. Protection of Habitats and Flora

Protection of Fauna

No specific mitigation measures for potential impacts on fauna were identified in addition to the embedded design features such as the Landscape Plan providing continuous green corridors through the Site and the public lighting plan.

17.3.3. Biodiversity Enhancement Measures

Enhancement 1: Landscape Management

Soft landscaping will be managed in such a way as to promote pollinators (e.g., pollinator friendly mowing regime, planting of native wildflower meadows and native tree species), please see Landscape Plan and Landscape Rationale Report (Gannon and Associates, 2024).

Enhancement 2: Bat Boxes

By way of enhancement, bat boxes will be erected at the Site, on suitably mature trees located along the main park and wetland area, under the guidance of the Project Ecologist. The bat box type installed will be the 2F Schwegler Bat Box or a similar durable woodcrete make. Additional bat boxes may also be installed along any linear vegetated features that have no night-time lighting.

The bat boxes will be located in locations unlit by night-time lighting and *ca.*4m above the ground to prevent disturbance. The linear features at the Site were noted to support bat foraging activity and so the provision of new roosting opportunities will act to enhance bat usage of the Site.

Enhancement 3: Swift Bricks

It is proposed to include swift bricks or external swift boxes on the facades of the 3 & 4 storey buildings. The Swift bricks/boxes will be installed side by side in sets of up to 10, as swifts are a social nesting species. The bricks/boxes will be installed a minimum of 5m off the ground, and care will be taken to ensure no obstacles or plate glass windows are located below the bricks/boxes.

Guidelines for the bird box scheme should also follow guidelines published by Swift Conservation Ireland, and those published by Birdwatch Ireland entitle “Saving Swifts” (2009/2010). The incorporation of swift bricks/boxes will help recover the declining swift population, which are now Red Listed in Ireland (Gilbert et al., 2021).

Swifts are a “clean” bird species which remove their own wastes from their nests periodically. As such, swift bricks/boxes do not require any cleaning by the management company.

It is advised to install a swift calling system to attract Swifts and encourage them to take up residence at a new site. A swift calling system is a small speaker set-up that plays swift calls during the summer. It should be located close to the brick entrances and has been seen to greatly increase the chances of swifts using the swift boxes/bricks. Solar powered options are possible.

An Ecologist will be instructed to set up the swift calling system once the construction of the Proposed Development

is complete. This can be with the help of active local Swift groups as required (e.g., Dublin Swift Conservation Group), who can help and advise as to the best set-up etc.

Enhancement 4: Bird Boxes

A minimum of 5 no. bird boxes are proposed to be installed within the main park area of the Site. Bird boxes should be installed prior to the breeding bird season to ensure their presence at the Site from February onwards, when birds begin seeking out new nest locations. Installation will be overseen by an Ecologist, and management will be taken in charge by the landscape management team of the Proposed Development during its Operational lifetime.

A range of different bird boxes are available that meet the specific need of the species of birds. The variety of options suitable for installation at the Site and information on the positioning of each type of box are outlined briefly below. A minimum of three boxes should be installed, with preference given to boxes suitable for amber- and red-listed species such as House Sparrow and Starling. Such boxes are described as follows:

- Sparrow Nest Box: For example, the Sparrow Nest Box System, which can be found at the following link: https://www.nhbs.com/sparrow-nest-box-system or the Sparrow Terrace, which can be found at the following link: https://www.nhbs.com/sparrow-terrace-nest-box .
- Starling Nest Box: This box type can be found at the following link: https://www.nhbs.com/woodpeckerstarling-nest-box

Sparrow nest boxes should be placed 2-4m off the ground with a clear flight path to the entrance. Starling nest boxes 3-4 metres above ground level where there is easy flight access and where it cannot be reached by cats or other potential predators.

Other appropriate bird box types are as follows:

- 'Hole type' bird boxes (28 mm hole): For example, the Eco Small Bird Box, which can be found at the following link: https://www.nhbs.com/eco-small-bird-box.
- Open fronted bird boxes for blackbirds: For example, the Blackbird FSC Nest Box, which can be found at the following link: https://www.nhbs.com/blackbird-fsc-nest-box.
- Open fronted bird boxes for wrens and robins: For example, the Eco Robin (Open-Fronted) Nest Box, which can be found at the following link: https://www.nhbs.com/eco-robin-open-fronted-nest-box.

Hole type bird boxes should be positioned 2-4m off the ground, with good-visibility, a clear flight line, and away from the prevailing wind direction. The open-fronted boxes for robins, wrens and blackbirds should be installed lower than 2m but amongst dense vegetation, or newly planted vegetation that will grow to become dense upon establishment, and somewhere cats and other predators won't easily see or access them. Boxes will not be drilled or nailed to trees to avoid damage, but instead be attached via a wire strap wrapped around the tree. Boxes will be located in areas away from direct exposure to public lighting to increase chances of uptake.

Enhancement 5: Ground nesting pollinator habitat

To enhance the Site's value to pollinating species that inhabit nests on the ground, such as mining bees, bare earth banks will be included in suitable areas within the main park, where the potential for damage from humans is limited (i.e., away from main pathways, suitably fenced, etc). These banks will be maintained as bare ground with minimal vegetation to allow for mining bees and other ground nesting insects easy access. These banks should be formed by sandy soils, and faced south/southeast.

Monitoring

Construction Phase

Ecological Clerk of Works (ECoW)

A suitably qualified ECoW will be employed before commencement and for the duration of the Construction Phase, to provide ecological advice and input to the construction team. The ECoW will carry out the monitoring activities listed below for the duration of the Construction Phase of the Proposed Development.

NOTE: The ECoW will be employed several weeks before commencement of works on Site; to allow time for the scope of ECoW works to be reviewed by the ecologist and any necessary pre-construction surveys to be carried out.

- The ECoW will work with the Site manager and review the **surface water protection and tree protection measures** put in place to ensure their appropriateness and effectiveness. The Site Manager will be responsible for maintaining these measures throughout the Construction Phase, however the ECoW will review these during periodic visits to the Site.
- The ECoW will also prepare an **Invasive Species Management Plan** for the Site prior to commencement of works to remove and manage the existing Japanese knotweed and butterfly bush infestations at the Site.
- The ECoW will visit the Site and **assess the night-time lighting measures in place for the Construction Phase**; to ensure that they will not cause any impacts to local bats during the nighttime. The ECoW will consult this Biodiversity Chapter to understand the priority areas for bat commuting/foraging at the Site and make recommendations where required.
- The ECoW will be required to work closely with the Site Manager and Arborist; to arrange to carry out **pre-clearance surveys** of any vegetation present on Site, especially if clearance during the period March 1st – August 31st (i.e., the breeding bird nesting season) is required. It is noted that clearance will be avoided during this period wherever possible through good management of the construction timeline. **Pre-felling checks of trees for bats** will also be conducted by the ECoW. This will include a **pre-commencement badger survey** of the Site for evidence of badger usage to ensure no badgers are impacted by the construction works.
- As part of the mitigation recommended in relation to mammals and other small fauna e.g., hedgehogs and common lizard, the ECoW will liaise with the Site Manager to ensure that an adequate level of **site tidiness** is being maintained, i.e., that construction materials such as netting, plastic sheeting etc., are being stored securely and above ground.
- The ECoW will also liaise with the Site Manager to ensure that **mammal escape measures** are in place across the construction site in terms of excavations such as trenches, basements, foundations i.e., that planks or objects are being left in place at a suitable corner of any excavations each night.

Project Arborist

The project Arborist will be instructed **prior to commencement on Site**; to ensure that appropriate tree protection measures are in place. The hedgerows and treelines retained will be sufficiently protected for the duration of the Construction Phase to maximise their ecological value in the final landscape plan. The ECoW will report any issues relating to failure in the tree protection measures on Site to the project Arborist and the Site Manager throughout the Construction Phase to ensure these sections of habitat are protected for the duration of the works.

Operational Phase

Ecologist

The ECoW will visit the Site post-construction to check the following are in place:

- **Swift and Bird Boxes –** A suitably qualified Ecologist/Ornithologist will liaise with the Site Manager to ensure that these measures are in place and appropriately installed**.**
- **Bat Boxes –** A suitably qualified Ecologist will liaise with the Site Manager to ensure that these measures are in place.

Summary of Mitigation and Monitoring

The following Table 17-2 summarises the mitigation and monitoring measures recommended for the Proposed Development.

Ecological Receptor	Relevant stage of the Proposed Development	Mitigation Measure	Monitoring Type	Details
Dodder Valley pNHA **Linked Habitats – Dodder River** **Otter** **Dodder Fish Assemblage**	Construction Phase	**Mitigation 1:** Surface Water Protection	ECoW Site Manager	The ECoW will be required to review and sign off on the surface water protection measures **prior to commencement of works** near any drainage ditches and watercourses. The surface water protection measures will remain in place and be maintained by the contractor **for the duration of the Construction Phase**.

Scrub, Hedgerows and Treelines	Construction Phase	**Mitigation 2:** Biosecurity **Mitigation 3:** Tree Protection Measures	ECoW Site Manager	Biosecurity measures will be implemented at the Construction Site by the Contractor. The ECoW will prepare an Invasive Species Management Plan (ISMP) **prior to commencement of works** on Site. This will include an updated botanical survey during the botanical growing season to map the current extent of any invasive species on Site. The project Arborist will be instructed **prior to commencement on Site**; to ensure that appropriate tree protection measures are in place to protect the hedgerow and treeline habitat being retained on Site. These measures will entail robust fencing around the root protection zones of all trees and hedgerows being retained on Site. An adequate level of signage will also be provided to highlight 'no work zones' and ensure that Site creep and
Ecological Receptor	**Relevant stage of the Proposed Development**	**Mitigation Measure**	**Monitoring Type**	**Details**
				damage to retained habitats does not occur. The project Arborist, the project Ecologist and the Site Manager will work together to ensure these sections of hedgerow/treelines are protected for the duration of the works.
Bats	Construction Phase	**Mitigation 4:** Construction Phase Lighting **Mitigation 5:** Bat Precautions when Felling Trees.	ECoW	The ECoW will be required **to check all trees to be felled for bats prior to felling.** In the event that a roosting bat is found, no felling of the tree in question will take place and a derogation licence will be obtained from the NPWS to proceed. The Area around the tree will be protected with an appropriate buffer to prevent disturbance of the bat. The ECoW will **assess the lighting measures in place for the Construction Phase**; to ensure that they will not cause any impacts to local bats during the night time. The ECoW will consult this Biodiversity Chapter to understand the priority areas for bat commuting/foraging at the Site and make recommendations where required.

Birds, mammals (excl. bats), common lizard	Construction Phase	**Mitigation 6:** Vegetation Clearance **Mitigation 7:** Construction Site Management for Fauna	ECoW	Pre-clearance survey for badgers by a suitably qualified Ecologist. The ECoW will be required to work closely with the Site Manager; to arrange to carry out **pre-clearance surveys** of any vegetation present on Site, especially if clearance during the period March 1st – August 1st (i.e., the breeding bird nesting season) is required. It is noted that clearance will be avoided during this period wherever possible through good management of the construction timeline. The ECoW will also liaise with the Site Manager to ensure that **mammal escape measures** are in place across the construction site in terms of excavations such as trenches, basements, foundations i.e., that planks or objects are being left in place at a suitable corner of any excavations each night.
Bats	Operational Phase	**Enhancement 2:** Bat Boxes	Ecologist	**Bat Boxes** – A suitably qualified Ecologist will oversee installation of bat boxes and liaise with the Site Manager to ensure that these enhancement measures are functional.
Swifts	Operational Phase	**Enhancement 3:** Swift Bricks	Ecologist	**Swift-Bricks** – A suitably qualified Ecologist will oversee installation of swift calling system and liaise with the Site Manager to ensure that swift box enhancement measures are functional.
Breeding Bird Assemblage	Operational Phase	**Enhancement 4:** Bird Boxes	Ecologist	**Bird Boxes** – A suitably qualified Ecologist will oversee installation of the bird boxes and liaise with the Site Manager to ensure that these measures are functional.
Pollinators	Operational Phase	**Enhancement 5:** Ground nesting pollinator habitat	Ecologist	**Bare Earth Banks –** A suitably qualified Ecologist will review the locations of the bare earth banks and their management to ensure they are effective and functional.

Table 17-2. Summary of Construction and Operational Phase Mitigation and Monitoring

17.3.4 Land, Soil and Geology

17.3.4.1 Mitigation Measures

Construction Stage

The Site Investigation Report included as an Appendix, has shown that the lands are composed of varying sequences of strata generally comprised of topsoil and glacial till. Made ground has also been identified in a single trail pit, i.e. TP11 located at the south-east extremity of the lands and falls under the portion of development currently under construction, i.e. Ballycullen Gate. A total of 43 No. trial pits were carried out across the LAP lands.

Environmental Laboratory chemical analysis has indicated that the in-fill constituents are non-hazardous. Excavated material from this location will be continuously monitored/inspected for signs of hazardous material contamination during excavation. Should there be any indication of hazardous material contamination, it may be required to be further sampled and analysed to confirm its chemical properties and waste category classification as per the waste landfill facility requirements.

Practical measures have been implemented during the design process to ensure that cut and fill volumes generated have been kept to a minimum by ensuring proposed road and building levels match existing ground levels insofar as is possible. Surplus subsoil and rock may be relocated to approved areas of the subject site that may require in-fill, or if required to be removed from site, will be deposited in approved fill areas off-site (Article 27 notification to the EPA required), or to an approved waste disposal facility.

In the case of topsoil careful planning and on-site storage will ensure that this resource is reused on-site as much as possible. Any surplus of soil not reused on site can be sold. However, topsoil is quite sensitive and can be rendered useless if not stored and cared for properly.

- Topsoil will be kept completely separate from all other construction waste as any cross-contamination of the topsoil can render it useless for reuse.
- Topsoil will be protected from all kinds of vehicle damage and kept away from site-track, delivery vehicle turning areas, and site plant and vehicle storage areas.
- Careful separation of builder's rubble packaging and contaminated waste from re-usable material will result in the minimisation of the disposal of material to landfill.
- Spoil heap/stockpiles will not be located within 20m of the existing surface water networks.
- Spoil heaps/stockpiles will be considered for seeding if their storage is likely to be longer than a few seasons.
- Topsoil will be stored in stockpiles less than two metres in height as otherwise the soil matrix (internal structure) can be damaged beyond repair. It will also be kept as dry as possible and used as soon as possible to reduce any deterioration through lengthy storage and excess moving around the site.

In the unlikely case of a topsoil surplus the Contractor will carry out appropriate environmental chemistry testing in order to determine the waste classification of the soils that are to be excavated and that will include Waste Acceptance Criteria testing. The test regime will be agreed with the receiving landfill operator, if not suitable for an Article 27 transfer, and the testing will be carried out by an accredited laboratory.

Records of topsoil storage, movements and transfer from site will be kept by the C&D Waste Manager. It is projected that all the topsoil will be reused on-site for landscaping purposes in both private residential gardens and public green areas.

A Discharge Licence will need to be obtained from the local Authority by the Main Contractor. Untreated surface water will not be permitted to flow to any natural or piped surface water network.

Silt traps, silt fences and tailing ponds will be provided by the contractor where necessary to prevent silts and soils being washed away by heavy rains during the course of the construction phase. All surface water will be treated for silts and sediment prior to disposal to the surface water network. Any and all other conditions, restrictions, or limits associated with the discharge license shall be adhered to.

The provision of wheel wash areas at the exit/s to the development as necessary will minimise the amount of soil deposited on the surrounding road network. The adjoining road network will be cleaned on a regular basis. All trucks carrying soils on the public road will be covered and carry a maximum of 10 cubic metres of material to prevent spillage and damage to the surrounding road network.

Appropriate storage and bunding measures will be implemented throughout the construction stage to prevent contamination of the soil and groundwater from oil and petrol leakage from site plant. Refuelling will be restricted to allocated re-fuelling areas. This storage area is to be an impermeable, roofed, bunded area, designed to contain 110% of the volume of fuel stored. Emergency fuel spill kits are to be stored on-site with designated staff familiar with their usage. Spill kit facilities will be provided for across the site.

If groundwater is encountered during excavations, mechanical pumps will be required to remove that groundwater from sumps. Sumps should be carefully located and constructed to ensure that groundwater is efficiently removed from excavations and trenches.

Where feasible all ready-mixed concrete will be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying subsoil. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility offsite.

Nuisance dust emissions from construction activities are a common and well recognised problem. Fine particles from these sources are recognised as a potential significant cause of pollution.

The main contractor will be required to demonstrate that both nuisance dust and fine particle emissions from the site are adequately controlled and are within acceptable limits.

Dust and fine particle generation from construction and demolition activities on the site can be substantially reduced through carefully selected mitigation techniques and effective management. Once particles are airborne it is very difficult to prevent them from dispersing into the surrounding area. The most effective technique is to control dust at source and prevent it from becoming airborne, since suppression is virtually impossible once it has become airborne.

The following are techniques and methods which are widely used currently throughout the construction industry, and which will be used in the development.

1. The roads around the site are all surfaced, and no dust is anticipated arising from unsealed surfaces.
2. A regime of ‘wet’ road sweeping will be set up to ensure the roads around the immediate site are as clean and free from dirt / dust arising from the site, as is reasonably practicable. This cleaning will be carried out by approved mechanical sweepers.
3. Footpaths immediately around the site will be cleaned by hand regularly, with damping, as necessary.
4. High level walkways and surfaces such as scaffolding will be cleaned regularly using safe ‘wet’ methods, as opposed to dry methods.

5. Vehicle waiting areas or hard standings will be regularly inspected and kept clean by brushing or vacuum sweeping and will be regularly sprayed to keep moist, if necessary.
6. Vehicle and wheel washing facilities will be provided at the site exit(s). If necessary, vehicles will be washed down before exiting the site.
7. Netting will be provided to enclose scaffolding in order to mitigate escape of airborne dust from the new buildings.
8. Vehicles and equipment will not emit black smoke from exhaust system, except during ignition at start up.
9. Engines and exhaust systems will be maintained so that exhaust emissions do not breach stationary emission limits set for the vehicle / equipment type and mode of operation.
10. Servicing of vehicles and plant will be carried out regularly, rather than just following breakdowns.
11. Internal combustion plant will not be left running unnecessarily.
12. Exhaust direction and heights will be such as not to disturb dust on the ground and to ensure adequate local dispersal of emissions.
13. Fixed plant such as generators will be located away from residential areas.
14. The number of handling operations for materials will be kept to a minimum in order to ensure that dusty material is not moved or handled unnecessarily.
15. The transport of dusty materials and aggregates will be carried out using covered / sheeted lorries.
16. Material handling areas will be clean, tidy, and free from dust.
17. Vehicle loading will be dampened down and drop heights for material to be kept to a minimum.
18. Drop heights for chutes / skips will be kept to a minimum.
19. Dust dispersal over the site boundary will be minimised using static sprinklers or other watering methods, as necessary.
20. Stockpiles of materials will be kept to a minimum and if necessary, they will be kept away from sensitive receptors such as residential areas etc.
21. Stockpiles where necessary, will be sheeted or watered down.
22. Methods and equipment will be in place for immediate clean-up of spillages of dusty material.
23. No burning of materials will be permitted on site.
24. Earthworks excavations will be kept damp where necessary and where reasonably practicable.
25. Cutting on site will be avoided where possible by using pre-fabrication methods.
26. Equipment and techniques for cutting / grinding / drilling / sawing / sanding etc, which minimise dust emissions and which have the best available dust suppression measures, will be employed.
27. Where scabbling is to be employed, tools will be fitted with dust bags, residual dust will be vacuumed up rather than swept away, and areas to be scabbled will be screened off.
28. Wet processes will be used to clean building facades if possible. If dry grit blasting is unavoidable, then areas of work will be sealed off and dust extraction systems used.

29. Where possible pre-mixed plasters and masonry compounds will be used to minimise dust arising from on-site mixing.
30. Prior to commencement, the main contractor will identify the construction operations which are likely to generate dust and to draw up action plans to minimise emissions. Furthermore, the main contractor will prepare environmental risk assessments for all dust generating processes, which are envisaged.
31. The main contractor will allocate suitably qualified personnel to be responsible for ensuring the generation of dust is minimised and effectively controlled.
32. Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced road, the limit shall be 20 kph, and on surfaced roads as site management dictates.

    The construction of the proposed development has potential to cause a slight, adverse, temporary, residual impact on soils in the immediate vicinity of the site.

Operational Stage

On completion of the construction phase and following replacement of topsoil, a planting programme will commence to prevent soil erosion.

SuDS and filtration devices are proposed to be provided as part of the development. These will help to remove pollutants from rainwater runoff. They will require periodic inspection and maintenance as per their installation manuals. These have been designed in accordance with the Greater Dublin Regional Code of Practice for Drainage Works Volume 6.0 (GDRCPDW) and the SuDS Manual CIRIA C753.

Foul drainage and watermains have been designed in accordance with their respective Codes of Practice by Uisce Eireann. A Pre-Connection Enquiry was submitted to Uisce Éireann and a Confirmation of Feasibility has been received and is included as an appendix to the Engineering Assessment Report, submitted under a separate cover.

Therefore, the risk of accidental discharge has been adequately addressed and mitigated through design.

The operation of the proposed development is not considered to have an impact on soils in the immediate vicinity of the site.

17.3.4.2 Monitoring

Construction Stage

Monitoring during the construction phase is recommended, in particular to the following items (if applicable):

- Excavation of the historic in-fill material.
- Adequate protection of topsoil/subsoil stockpiled for reuse.
- Adequate protection from contamination of soils for removal.
- Monitoring of surface water discharging to the existing surface water drainage system.
- Monitoring cleanliness of the adjoining road network.
- Monitoring measures for prevention of oil and petrol spillages.
- Dust control by dampening down measures, when required due to dry weather conditions.

Operational Stage

During the operation phase, the surface water network (drains, gullies, manholes. AJs, SuDS Devices, attenuation systems etc.) will need to be regularly maintained and where required cleaned out. A suitable maintenance regime of inspecting and cleaning will be incorporated into the safety file/maintenance manual for the development.

Surface SuDS features can typically be maintained as part of the regular maintenance of the landscape, incorporating litter picking, grass cutting, and inspections. Figure 0-4: Regular Maintenance Requirements for SuDS, is an extract from Section 12.3 of the Council's SuDS Design & Evaluation Guide, and generally describes the regular maintenance aspect for the SuDS.

Type	Activity	Normal site care (Site) or SuDS-specific maintenance (SuDS)	Suggested frequency
Regular Maintenance			
Litter	Pick up all litter in SUDS Landscape areas along with remainder of the site – remove from site	Site	1 visit monthly
Grass	Mow all grass verges, paths and amenity grass at 35-50mm with 75mm max. Leaving cuttings in situ	Site	As required or 1 visit monthly
Grass	Mow all dry swales, dry SUDS basins and margins to low flow channels and other SUDS features at 100mm with 150mm max. Cut wet swales or basins annually as wildflower areas – 1st and last cuts to be collected	Site	4-8 visits per year or as required
Grass	Wildflower areas strimmed to 100mm in Sept or at end of school holidays – all cuttings removed Or Wildflower areas strimmed to 100mm on 3 year rotation – 30% each year – all cuttings removed	Site	1 visit annually 1 visit annually
Inlets & outlets	Inspect monthly, remove silt from slab aprons and debris. Strim 1m round for access	SuDS	1 visit monthly
Permeable paving	Sweep all paving regularly to keep surface tidy	Site	1 visit annually or as required

Figure 17.1-30: Regular Maintenance Requirements for SuDS

There will still be a remaining requirement for more intensive maintenance tasks to be undertaken however, the severity of these tasks can be reduced by regular inspections and proactive responses being incorporated as a part of the regular maintenance regime discussed above. A table showing the typical requirements for the occasional maintenance tasks and remedial works is extracted from the Council's SuDS Design & Evaluation Guide to the figure overleaf.

Occasional Tasks			
Permeable paving	Sweep and suction brush permeable paving when ponding occurs	SuDS	As required - estimate 10-15 year intervals
Flow controls	Annual inspection of control chambers - remove silt and check free flow	SuDS	1 visit annually
Wetland & pond	Wetland vegetation to be cut at 100mm on 3 – 5 year rotation or 30% each year. All cuttings to be removed to wildlife piles or from site.	Site	As required
Silt	Inspect swales, ponds, wetlands annually for silt accumulation	Site & SuDS	1 visit annually
Silt	Excavate silt, stack and dry within 10m of the SUDS feature, but outside the design profile where water flows. Spread, rake and overseed.	Site & SuDS	As required
Native planting	Remove lower branches where necessary to ensure good ground cover to protect soil profile from erosion.	SuDS	1 visit annually
Remedial Work			
General SuDS	Inspect SuDS system to check for damage or failure when carrying out other tasks. Undertake remedial work as required.	SuDS	Monthly As required

Figure 17.2 Regular Maintenance Requirements for SuDS

17.3.5 Water

17.3.5.1 Mitigation Measures

Construction Stage

The following mitigation measures are to address potential impacts to water quality and are required to protect the onsite and downstream receiving surface water networks and natural environment. All works will be undertaken with reference to the following guidelines:

- CIRIA C532: Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (Masters-Williams et al., 2001);
- CIRIA C692: Environmental Good Practice on Site, (Audus et al., 2010)
- BPGCS005: Oil Storage Guidelines;
- CIRIA C648: Control of Water Pollution from Linear Construction Projects: Technical Guidance (Murnane et al., 2006a)
- CIRIA C648: Control of Water Pollution from Linear Construction Projects: Site Guide (Murnane et al., 2006a)
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016)

- Guidelines for Planning Authorities – Architectural Heritage Protection – Guidance on Part IV of the Planning and Development Act 2000. (Part 2, Chapter 7) and ICOMOS Principles.
- Construction Industry Research and Information Association (CIRIA) Environmental Good Practice on Site (C650), 2005.
- Eastern Regional Fisheries Board, (2006), Fisheries Protection Guidelines: Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites.
- CIRIA 697, The SUDS Manual, 2007; and
- UK pollution Prevention Guidelines (PPG) UK Environment Agency, 2004

The schedule of mitigation presented within the following table summarises measures that will be undertaken in order to reduce impacts on ecological receptors within the zone of influence of the proposed development.

No.	Risk	Possible Impact	Mitigation	Result of Mitigation
1	Hydrocarbons from carparking area entering the drainage network.	Water quality impacts.	Petrol interceptor to be installed on drainage network prior to outfall to public surface water network.	Prevents hydrocarbons from entering the public surface water network.
2	Pollutants from site compound areas entering the drainage network or contaminating soils.	Water quality impacts. Soil quality impacts. Groundwater impacts.	Materials to be stored appropriately in designated areas (discussed below). Temporary foul water connection to be obtained from Uisce Éireann to serve site compound welfare facilities.	Prevents contamination of public surface water network, soil, and groundwater.
3	Pollutants from material storage areas entering the watercourse or contaminating soils.	Water quality impacts. Soil quality impacts. Groundwater impacts.	Fuels, oils, greases, and other potentially polluting chemicals will be stored in roofed and bunded compounds at the Contractor's compound. Storage area to be located over 50m away to ensure no direct pathway to the surface water network. Bunds are to be provided with 110% capacity of storage container. Spill kits will be kept on site at all times and all staff trained in their appropriate use. Method statements for dealing with accidental spillages will be provided the Contractor for review by the Employer's Representative.	Prevents contamination of public surface water network, soil, and groundwater.
4	Concrete/ cementitious materials entering the drainage network.	Water quality impacts	A designated wash down area within the Contractor's compound will be used for cleaning of any equipment or plant, with the safe disposal of any contaminated water.	Prevents contamination of public surface water network. Ensures invasive species material is not transported off site as muck.
5	Leaching of contaminated soil into groundwater.	Groundwater quality impacts	Spill kits will contain 10 hr terrestrial oil booms (80mm diameter x 1000mm) and a plastic sheet, upon which contaminated soil can be placed to prevent leaching to ground water.	Prevents contamination of groundwater.
6	Pollutants from equipment storage/ refuelling area entering the drainage network.	Water quality impacts	Any refuelling and maintenance of equipment will be done at designated bunded areas with full attendance of plant operative(s) within contained areas. Discharge licence (where required) pollutant limits to be monitored and adhered to. The site is located at least 50m from any direct pathway to the surface water drainage network.	Prevents contamination of public surface water network.
7	Runoff from exposed work areas and excavated material storage areas entering the drainage network.	Water quality impacts due to silt entering the network.	Provision of silt entrapment facilities such as; straw bales, silt fencing, silt barriers, diversion drains, settlement tank(s), & settlement pond(s), as appropriate and as outlined below.	Prevents contamination of public surface water network.

Table17-3: Schedule of Surface Water Mitigation Measures

The most significant potential sources of contamination to the local surface water network during construction are silt, suspended particles, and chemical compounds carried by surface water runoff. Silt and suspended particles may originate from runoff over stockpiled materials or from water pumped out of excavations. To mitigate these risks, sediment entrapment facilities are essential to reduce sediment discharge into downstream properties and receiving waters. All runoff from disturbed areas will pass through these facilities before leaving the site to prevent sedimentation in downstream areas. Site stripping will be minimized to reduce erosion.

Several methods will be employed to manage sediment and silt. Straw bales can be placed at the base of slopes as temporary sediment barriers, though they are not recommended for use in swales or channels. Proper installation and maintenance are crucial as their effectiveness typically lasts only a few weeks or months. Silt fencing, made from woven synthetic geotextile material, will act as a temporary barrier along disturbed areas' contours. These fences are durable, lasting more than one season with proper maintenance, but are unsuitable for areas of concentrated flow, where more robust filtration would be necessary. Silt barriers will also be temporarily installed in road gullies on partially constructed roads to prevent sediment from entering downstream drainage systems or SuDS components. Where larger catchment areas are involved, diversion drains—simple ditches often supported by earth bunds—will channel runoff to sediment basins, which can be lined with geotextiles or stones if erosion occurs.

Settlement tanks, commercially available for this purpose, will also be used to allow suspended solids like sand and silt to settle out before runoff is discharged. Spoil heaps and stockpiles will be kept at least 20 meters away from existing surface water networks, and drainage diversion ditches will be constructed between stockpile areas and surface water networks, directing runoff to sedimentation ponds. If gravity outfall is not feasible, modular settlement tanks will be used, or outfall volumes may be pumped. No untreated surface water will be allowed to flow into natural or piped surface water networks.

During construction, the site will include compounds for offices and welfare facilities, with sanitary connections arranged with Uisce Éireann via a Temporary Connection Application. The contractor will manage daily material deliveries and ensure secure storage on-site. Measures will also be taken to prevent chemical contamination from fuel or chemical spills, which could impact soil, groundwater, and surface water. Method statements and mitigation measures will be put in place to prevent leaks and spills, including the installation of bunded and roofed storage areas for oil and petrol, designated fueling points with interceptors, and spill kits.

Where feasible, and subject to licensing, temporary connections to the public foul sewer will be used during construction for vehicle washdown water, treated via appropriate pollution control and attenuation measures. If this connection is not possible, wastewater will be stored and treated off-site at a licensed facility.

Surface water runoff from the site will be treated before discharge using settlement tanks or ponds in conjunction with proprietary treatment systems like full retention petrol interceptors and spill protection measures. Water quality will be monitored at a sampling chamber downstream of the settlement pond or tank, with regular testing as required by the discharge license. The project ecologist and site foreman will establish trigger levels for halting works if water quality standards are not met, and alternative pollution control measures will be implemented if necessary.

The discharge of surface water, post-treatment, to the public surface water network will be confirmed with the Local Authority, along with the required levels of contamination and testing frequency as part of the discharge license application. All water pumped from excavations will be treated for silt and other contaminants, with regular monitoring for hydrocarbon sheen and suspended solids, and periodic laboratory testing as specified by the Local Authority.

In addition to daily visual inspections, a comprehensive surface water monitoring program will be implemented throughout construction to ensure the protection of water quality, following the guidelines from Transport Infrastructure Ireland (TII). The parameter limit values defined in the Fresh Water Quality Regulations (EU Directive 2006/44/EEC) will serve as trigger values for surface water monitoring.

Parameter	Limit		Frequency and Manner of Samplings
	Limit Value	Guide/Mandatory	
Temperature	1.5°C	Mandatory Limit	Weekly, and at appropriate intervals where the works activities associated with the scheme have the potential to alter the temperature of the waters.
Dissolved oxygen	50% of Samples ≥ 9 (mg/l O2) 100% of Samples ≥ 7 (mg/l O2)	Guide Limit	Weekly, minimum one sample representative of flow oxygen conditions of the day of sampling
pH	6 to 9	Mandatory Limit	Weekly
Nitrites	≤0.01 (mg/l N02)	Guide Limit	Monthly
Suspended Solids	≤25 (mg/l)	Guide Limit	Monthly
BOD5	≤3 (mg/l)	Guide Limit	Monthly
Phenolic Compounds	-	-	Monthly where the presence of phenolic compounds is presumed (An examination by test)
Petroleum Hydrocarbons	5 (mg/l)	Guide Limit	Monthly (visual)
Non-Ionized Ammonia	≤ 0.005 (mg/l NH3)	Guide Limit	Monthly
Total Ammonium	≤ 0.004 (mg/l NH4)	Guide Limit	Monthly
Total Residual Chlorine	≤ 0.005 (mg/l HOCl)	Mandatory Limit	At appropriate intervals where works activities associated with the scheme have the potential to alter the Total residual Chlorine of the waters
Electrical Conductivity	-	-	Weekly

Table 17-4: Monitoring Guidelines (Fresh Water Quality Regulations)

The Main Contractor will hold overall responsibility for implementing the Construction Surface Water Management Plan (CSWMP) during the construction phase. A designated member of the Main Contractor's team, who is appropriately trained, will be assigned the authority to ensure all site personnel comply with the CSWMP. Additionally, each sub-contractor will designate a representative responsible for the ongoing execution of the CSWMP within their respective operations.

Copies of the CSWMP will be distributed to all relevant personnel on-site. Both site personnel and sub-contractors will be briefed on the CSWMP's objectives and their specific responsibilities under the plan.

The appointed person's responsibilities will include:

- Updating the CSWMP as needed to reflect on-site activities.
- Advising site management on environmental matters, including pre-construction checks for protected species.
- Reviewing sub-contractors' method statements to ensure they incorporate all aspects of the CSWMP.
- Providing training, including toolbox talks, to ensure all personnel understand and can implement mitigation measures.

- Assessing the effectiveness of mitigation measures and monitoring weather forecasts and site conditions where trigger levels are required.
- Ensuring adherence to specific measures outlined in the Planning Conditions.
- Advising on the production of method statements and site environmental rules, and ensuring these are communicated to the workforce.
- Investigating environmental incidents, ensuring corrective actions are taken, and recommending measures to prevent recurrence.
- Maintaining all environmental documentation and ensuring that the plant used is environmentally suited to the tasks.
- Coordinating environmental planning of construction activities to meet environmental authority requirements, while minimizing environmental risks.
- To minimize adverse effects, the timing of site stripping will consider prevailing weather conditions and the time of year. Precast concrete units will be used where possible to reduce on-site "wet" concrete mixing, and in-situ concrete pours will be managed according to best practices to prevent overspills. Wheel wash and washdown facilities will be provided in designated areas, with discharge directed into settlement ponds or silt traps.
- For any construction near existing watermains, the contractor will produce a detailed method statement outlining procedures. All watermains will be cleaned and tested according to Uisce Éireann guidelines before connection to the public watermain, with connections performed under Uisce Éireann's supervision.
- To mitigate the risk of defective or leaking foul and surface sewers, several measures will be implemented:
- New foul sewers will undergo air testing during construction, in line with Uisce Éireann's Code of Practice.
- Private drainage systems will be inspected and signed off by the Design Engineer, complying with Building Regulations Part H and BCAR requirements.
- Foul sewers will be surveyed by CCTV before connection to identify potential defects.
- Connections to the public sewer will be carried out under Uisce Éireann's supervision and checked before commissioning.
- Utilities and public services will be identified and protected before any excavation in public areas begins.
- Surface water networks will be constructed and tested according to Local Authority requirements for Taking in Charge.
- These measures will ensure that construction activities comply with environmental standards, minimizing the risk of water contamination and infrastructure defects.

Operational Phase

The implementation of the following operation stage mitigation measures will minimise the impact on the hydrology and hydrogeology aspects of the development lands:

The surface water drainage network has been designed in accordance with the CIRIA SUDS Manual and the Greater Dublin Strategic Drainage Scheme. The appropriate interception mechanisms and treatment train process has been incorporated into the design. A detailed SUDS maintenance manual has been provided under a sperate cover.

Surface water outflow will be restricted to or below the equivalent greenfield runoff rate from the proposed detention basin as per the drainage design, in accordance with South Dublin County Council requirements.

Sustainable urban drainage measures, including permeable paving, swales, and rain gardens will be provided to improve water quality.

A petrol interceptor will be installed to prevent hydrocarbons entering the local drainage system at the outfall.

A maintenance regime for the SuDS features will be incorporated to the Operation and Maintenance manual for the development. Surface SuDS features can typically be maintained as part of the regular maintenance of the landscape,

incorporating litter picking, grass cutting, and inspections. Table 0-5: Regular Maintenance Requirements for SuDS is an extract from Section 12.3 of the SuDS Design & Evaluation Guide, and generally describes the regular maintenance aspect for the SuDS.

Type	Activity	Normal site care (Site) or SuDS-specific maintenance (SuDS)	Suggested frequency
Regular Maintenance			
Litter	Pick up all litter in SUDS Landscape areas along with remainder of the site – remove from site	Site	1 visit monthly
Grass	Mow all grass verges, paths and amenity grass at 35-50mm with 75mm max. Leaving cuttings in situ	Site	As required or 1 visit monthly
Grass	Mow all dry swales, dry SUDS basins and margins to low flow channels and other SUDS features at 100mm with 150mm max. Cut wet swales or basins annually as wildflower areas – 1st and last cuts to be collected	Site	4-8 visits per year or as required
Grass	Wildflower areas strimmed to 100mm in Sept or at end of school holidays – all cuttings removed Or Wildflower areas strimmed to 100mm on 3 year rotation – 30% each year – all cuttings removed	Site	1 visit annually 1 visit annually
Inlets & outlets	Inspect monthly, remove silt from slab aprons and debris. Strim 1m round for access	SuDS	1 visit monthly
Permeable paving	Sweep all paving regularly to keep surface tidy	Site	1 visit annually or as required

Table 17-5: Regular Maintenance Requirements for SuDS

There will still be a remaining requirement for more intensive maintenance tasks to be undertaken however, the severity of these tasks can be reduced by regular inspections and proactive responses being incorporated as a part of the regular maintenance regime discussed above. Table 0-3: Further Maintenance Requirements for SuDS shows the typical requirements for the occasional maintenance tasks and remedial works, extracted from the SuDS Design & Evaluation Guide.

Occasional Tasks			
Permeable paving	Sweep and suction brush permeable paving when ponding occurs	SuDS	As required - estimate 10-15 year intervals
Flow controls	Annual inspection of control chambers - remove silt and check free flow	SuDS	1 visit annually
Wetland & pond	Wetland vegetation to be cut at 100mm on 3 – 5 year rotation or 30% each year. All cuttings to be removed to wildlife piles or from site.	Site	As required
Silt	Inspect swales, ponds, wetlands annually for silt accumulation	Site & SuDS	1 visit annually
Silt	Excavate silt, stack and dry within 10m of the SUDS feature, but outside the design profile where water flows. Spread, rake and overseed.	Site & SuDS	As required
Native planting	Remove lower branches where necessary to ensure good ground cover to protect soil profile from erosion.	SuDS	1 visit annually
Remedial Work			
General SuDS	Inspect SuDS system to check for damage or failure when carrying out other tasks. Undertake remedial work as required.	SuDS	Monthly As required

Table 17-6: Further Maintenance Requirements for SuDS

Surface water sewers will generally consist of PVC (to IS 123) or concrete socket and spigot pipes (to IS 6) and laid strictly in accordance with Dublin City Council requirements for taking in charge. It is intended that all sewers within the public domain will be handed over to South Dublin County Council for taking in charge.

All private outfall manholes will be built in accordance with the Greater Dublin Regional Code of Practice for Drainage Works. No private drainage will be located within public areas.

Drains will be laid in accordance with the requirements of the Building Regulations, Technical Guidance Document H.

All SuDS and surface water drainage networks proposed in the public domain will be constructed to the standards required for Taking in Charge.

Water metering via district meters will be installed to Uisce Éireann requirements. Monitoring of the telemetry data will indicate any excessive water usage which may indicate the potential for a leak in the watermain network. Early identification of potential leaks will lead a faster response in determining the exact location of leaks and completion of remedial works.

It is not envisaged that any further remedial or reductive measures will be necessary upon completion.

17.3.5.2 Monitoring

Construction Stage

Implementation of the Construction Management Plan is required to protect the hydrology and groundwater elements of the subject lands during construction stage. Maintenance of the mitigation measures and monitoring of the management processed is required to ensure best practice.

The monitoring measures to be implemented include:

- Monitoring of the management and storage of dangerous chemicals and fuel.
- Monitoring and maintenance of the wash and wheel wash facilities.
- Regular maintenance and monitoring of the sediment control measures.
- Monitoring and maintenance of the SUDS features, road gullies and, attenuation ponds and or sedimentation facilities during the construction phase of the development.

Operation Stage

Monitoring and maintenance of the water metering telemetry, SUDS features, road gullies, attenuation, and flow control devices are imperative during the operation phase of the development

17.3.6 Air Quality

17.3.6.1 Mitigation Measures

Construction Phase

The proposed development has been assessed as having a medium risk of dust soiling impacts and a low risk of dust related human health impacts during the construction phase as a result of earthworks, construction and trackout activities (see Section 0). Therefore, the following dust mitigation measures shall be implemented during the construction phase of the proposed development. These measures are appropriate for sites with a medium risk of dust impacts and aim to ensure that no significant nuisance occurs at nearby sensitive receptors. The mitigation measures draw on best practice guidance from Ireland (DCC, 2018), the UK (IAQM (2024), BRE (2003), The Scottish Office (1996), UK ODPM (2002)) and the USA (USEPA, 1997). These measures will be incorporated into the overall Construction Environmental Management Plan (CEMP) prepared for the site. The measures are divided into different categories for different activities.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before works commence on site. Community engagement includes explaining the nature and duration of the works to local residents and businesses.
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details.

Site Management

- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions. Dry and windy conditions are favourable to dust suspension therefore mitigations must be implemented if undertaking dust generating activities during these weather conditions.
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.
- Hold regular liaison meetings with other high risk construction sites within 250 m of the site boundary where feasible, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.

Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicles / Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 15 kph haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.

- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste Management

- No bonfires or burning of waste materials.

Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.
- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust.

Measures Specific to Construction

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

Measures Specific to Trackout

- A speed restriction of 15 kph will be applied as an effective control measure for dust for on-site vehicles.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

Monitoring

- Undertake daily on-site and off-site inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results in the site inspection log. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Monitoring of construction dust deposition along the site boundary to nearby sensitive receptors during the construction phase of the proposed development is recommended to ensure mitigation measures are working satisfactorily. This can be carried out using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/m^2/day during the monitoring period of 30 days (+/- 2 days).

Operational Phase

There is no mitigation required for the operational phase of the development as effects on air quality are predicted to be ***direct, long-term, negative*** and ***not significant***.

17.3.6.2 Monitoring

Construction Phase

During working hours, dust control methods will be monitored in addition to the prevailing meteorological conditions.

Undertake daily on-site and off-site inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results in the site inspection log. This should include regular dust soiling checks (by visual inspection) of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary.

Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

Monitoring of construction dust deposition along the site boundary to nearby sensitive receptors during the construction phase of the proposed development is recommended to ensure mitigation measures are working satisfactorily. This can be carried out using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/m^2/day during the monitoring period of 30 days (+/- 2 days).

Operational Phase

There is no proposed monitoring during the operational phase.

17.3.7 Climate
17.3.7.1 Mitigation Measures

Construction Phase

Embodied carbon of materials and GHG emissions from construction activities will be the primary source of climate impacts during the construction phase. During the construction phase the following best practice measures shall be implemented on site to prevent significant GHG emissions and reduce impacts to climate:

- Creating a construction program which allows for sufficient time to determine reuse and recycling opportunities for construction wastes;
- Materials will be reused on site where possible;
- Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods;
- Ensure all plant and machinery are well maintained and inspected regularly;
- Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site;
- Material choices and quantities will be reviewed during detailed design, to identify and implement lower embodied carbon options where feasible;
- Sourcing materials locally where possible to reduce transport related CO_2 emissions; and
- The project shall review and determine compliance with the requirements set out in the EU Taxonomy Regulation (Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment and amending Regulation (EU) 2019/2088 (Text with EEA relevance) in relation to circular economy. This is specific to reuse, recycling and material recovery of demolition and construction wastes.

In terms of impact on the proposed development due to climate change, during construction the Contractor will be required to mitigate against the effects of extreme rainfall/flooding through site risk assessments and method statements. The Contractor will also be required to mitigate against the effects of extreme wind/storms, temperature extremes through site risk assessments and method statements. All materials used during construction will be accompanied by certified datasheets which will set out the limiting operating temperatures. Temperatures can affect the performance of some materials, and this will require consideration during construction. During construction, the Contractor will be required to mitigate against the effects of fog, lighting and hail through site risk assessments and method statements.

Operational Phase

As per the Energy & Sustainability Report prepared by Renaissance Engineering (submitted under separate cover with this planning application) the development will be a Nearly Zero Energy Building (NZEB) in accordance with the Building Regulations Technical Guidance Document L 2021 and the relevant sustainability policies within the South Dublin County Council Development Plan 2022-2028. The report details a number of measures that have been incorporated into the design of the development to reduce the impact on climate wherever possible. Such measures included in the proposed development to reduce the impact to climate from energy usage are:

- The units are targeting a Building Energy Ratio (BER) of A2.

- The development will be designed and constructed to limit heat loss, and where appropriate, limit heat gains through the fabric of the building. The thermal insulation for each of the plane elements will meet or exceed the U-Values requirements as specified in Part L.
- Reasonable care will be taken during the design and construction to limit the air permeability.
- Air-source heat pumps will be installed for the residential units to achieve the A2 BER.
- PV panels will be installed.
- A-rated, low-energy LED lamps will be utilised throughout the development.
- The development will achieve an Energy Performance Coefficient (EPC) < 0.30;
- The development will achieve a Carbon Performance Coefficient (CPC) < 0.35;
- The development will achieve a Renewable Energy Ratio (RER) > 0.20;

The above measures will assist in optimising the energy consumed by the development and will also have the benefit of reducing the impact to climate during the operational phase of the development.

Some measures have been incorporated into the design of the development to mitigate the impacts of future climate change. For example, adequate attenuation and drainage have been incorporated to avoid potential flooding impacts due to increased rainfall events in future years. These measures have been considered when assessing the vulnerability of the proposed development to climate.

17.3.7.2 Monitoring

There is no proposed monitoring during the construction phase or during the operational phase.

17.3.8 Noise

17.3.8.1 Mitigation Measures

Mitigation measures for the construction phase are set out below in order to reduce potential impacts as far as practicable to within the adopted criteria for noise and vibration.

Construction Phase - Noise

The contract documents will clearly specify the construction noise criteria included in this chapter which the construction works must operate within. The Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures and comply with the recommendations of BS 5228-1:2009+A1:2014 *Code of Practice for Noise and Vibration Control on Construction and Open Sites – Noise* and the *European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001*. These measures will ensure that:

- No plant used on site will be permitted to cause an ongoing public nuisance due to noise.
- The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract.
- Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers.
- Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use;

- Any plant, such as generators or pumps that is required to operate outside of normal permitted working hours will be surrounded by an acoustic enclosure or portable screen.

BS 5228 -1:2009+A1 2014 includes guidance on several aspects of construction site practices, which include, but are not limited to: -

- selection of quiet plant;
- noise control at source;
- screening;
- liaison with the public, and;
- monitoring.

Detailed comment is offered on these items in the following paragraphs. Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise and vibration monitoring, where required.

Selection of Quiet Plant

This practice is recommended in relation to static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.

Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control "at source". This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

Referring to the potential noise generating sources for the works under consideration, the following best practice migration measures should be considered:

- Where practical, site compounds will be located in excess of 30m from noise sensitive receptors within the site constraints. The use lifting bulky items, dropping and loading of materials within these areas should be restricted to normal working hours.
- For mobile plant items such as dump trucks, excavators and loaders, the installation of an acoustic exhaust and or maintaining enclosure panels closed during operation can reduce noise levels by up to 10 dB. Mobile plant should be switched off when not in use and not left idling.
- For concrete mixers, control measures should be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.
- For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.
- For compressors, generators and pumps, these can be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation.
- Demountable enclosures can also be used to screen operatives using hand tools and will be moved around site as necessary.

- All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Screening

Screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. Construction site hoarding will be constructed around the site boundaries as standard. The hoarding will be constructed of a material with a mass per unit of surface area greater than 7 kg/m2 to provide adequate sound insulation.

In addition, careful planning of the site layout will also be considered. The placement of site buildings such as offices and stores will be used, where feasible, to provide noise screening when placed between the source and the receiver.

Liaison with the Public

A designated environmental liaison officer will be appointed to site during construction works. Any noise complaints should be logged and followed up in a prompt fashion by the liaison officer. In addition, where a particularly noisy construction activity is planned or other works with the potential to generate high levels of noise, or where noisy works are expected to operate outside of normal working hours etc., the liaison officer will inform the nearest noise sensitive locations of the time and expected duration of the noisy works.

17.3.8.2 Monitoring

Where required, construction noise monitoring will be undertaken at periodic sample periods at the nearest noise sensitive locations to the development works to check compliance with the construction noise criterion.

Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise*.

Project Programme

The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. During excavation/ demolition or other high noise generating works are in progress on a site at the same time as other works of construction that themselves may generate significant noise and vibration, the working programme will be phased so as to prevent unacceptable disturbance at any time.

Construction Phase – Vibration

The vibration from construction activities will be limited to the values set out in Section 10.2. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Limit values have been provided for soundly constructed residential and commercial properties.

Operational Phase – Noise

Additional Traffic on Adjacent Roads

During the operational phase of the development, noise mitigation measures with respect to the outward impact of traffic from the development are not deemed necessary.

Mechanical Services Plant

Taking into account that sensitive receivers within the development are much closer than off-site sensitive receivers, once the relevant noise criteria is achieved within the development it is expected that there will be no negative impact at sensitive receivers off site, and therefore no further mitigation required.

Inward Noise

The development site itself has been categorised as a ***Low*** Risk in accordance with ProPG. With regard to the criteria outlined in section 10.2.3.4, review of the location of residential buildings on site, the external noise levels and the internal noise levels with windows open, the assessment has determined that specific noise mitigation measures are not required to the site boundary or site buildings to control noise intrusion to internal spaces or to control noise in the external amenity spaces.

Operational Phase – Vibration

No vibration mitigation measures are required applicable the operational phase.

17.3.9 Material Assets: Built Services

17.3.9.1 Mitigation Measures

Construction Phase

An Outline Construction Management Plan is submitted with this application, which includes the following construction stage mitigation measures. These site specific mitigation measures are tried and tested and proven to be effective and will be implemented in full.

A summary of these mitigation measures, as they affect Material Assets – Built Services, are provided below.

Dust and Dirt Control

Nuisance dust emissions from construction activities are a common and well recognised problem. Fine particles from these sources are recognised as a potential significant cause of pollution.

The main contractor will be required to demonstrate that both nuisance dust and fine particle emissions from the site are adequately controlled and are within acceptable limits.

Dust and fine particle generation from construction and demolition activities on the site can be substantially reduced through carefully selected mitigation techniques and effective management. Once particles are airborne it is very difficult to prevent them from dispersing into the surrounding area. The most effective technique is to control dust at

source and prevent it from becoming air borne, since suppression is virtually impossible once it has become air borne.

The following are techniques and methods which are widely used currently throughout the construction industry, and which may be used in the proposed development.

- The roads around the site are all surfaced, and no dust is anticipated arising from unsealed surfaces.
- Vehicles travelling on any unsurfaced site roads should have their speed restricted to 20 kph.
- A regime of 'wet' road sweeping can be set up to ensure the roads around the immediate site are as clean and free from dirt / dust arising from the site, as is reasonably practicable. This cleaning will be carried out by approved mechanical sweepers.
- Footpaths immediately around the site can be cleaned by hand regularly, with damping as necessary.
- High level walkways and surfaces such as scaffolding can be cleaned regularly using safe 'wet' methods, as opposed to dry methods.
- Vehicle waiting areas or hard standings can be regularly inspected and kept clean by brushing or vacuum sweeping and will be regularly sprayed to keep moist, if necessary.
- Netting can be provided to enclose scaffolding in order to mitigate escape of air borne dust from the existing and new buildings.
- Vehicles and equipment shall not emit black smoke from exhaust system, except during ignition at start up.
- Engines and exhaust systems should be maintained so that exhaust emissions do not breach stationary emission limits set for the vehicle / equipment type and mode of operation.
- Servicing of vehicles and plant should be carried out regularly, rather than just following breakdowns.
- Internal combustion plant should not be left running unnecessarily.
- Exhaust direction and heights should be such as not to disturb dust on the ground and to ensure adequate local dispersal of emissions.
- Where possible fixed plant such as generators should be located away from residential areas.
- The number of handling operations for materials will be kept to a minimum in order to ensure that dusty material is not moved or handled unnecessarily.
- The transport of dusty materials and aggregates should be carried out using covered / sheeted lorries.
- Material handling areas should be clean, tidy and free from dust.
- Vehicle loading should be dampened down and drop heights for material to be kept to a minimum.
- Drop heights for chutes / skips should be kept to a minimum.
- Dust dispersal over the site boundary should be minimised using static sprinklers or other watering methods as necessary.
- Stockpiles of materials should be kept to a minimum and if necessary, they should be kept away from sensitive receptors such as residential areas etc.
- Stockpiles were necessary, should be sheeted or watered down.
- Methods and equipment should be in place for immediate clean-up of spillages of dusty material.
- No burning of materials will be permitted on site.
- Earthworks excavations should be kept damp where necessary and where reasonably practicable.
- Cutting on site should be avoided where possible by using pre-fabrication methods.
- Equipment and techniques for cutting / grinding / drilling / sawing / sanding etc, which minimise dust emissions and which have the best available dust suppression measures, should be employed.
- Where scabbling is to be employed, tools should be fitted with dust bags, residual dust should be vacuumed up rather than swept away, and areas to be scabbled should be screened off.
- Wet processes should be used to clean building facades if possible. If dry grit blasting is unavoidable then ensure areas of work are sealed off and dust extraction systems used.
- Where possible pre-mixed plasters and masonry compounds should be used to minimise dust arising from on site mixing.

- Prior to commencement, the main contractor should identify the construction operations which are likely to generate dust and to draw up action plans to minimise emissions, utilising the methods highlighted above. Furthermore, the main contractor should prepare environmental risk assessments for all dust generating processes, which are anticipated.
- The main contractor should allocate suitably qualified personnel to be responsible for ensuring the generation of dust is minimised and effectively controlled.
- The name and contact details of a person to contact regarding air quality and dust issues should be displayed on the site boundary, this notice board should also include head/regional office contact details.

The contractor will be obliged to implement the mitigation measures outlined in the EIAR in respect of dust / dirt control.

Protection of Surface Waters

- The contractor will appoint a suitably qualified person to oversee the implementation of measures for the prevention of pollution to the receiving surface water environment.
- Where required, settlement pond / silt trap will be installed. Straw bales will be placed at the outfall of the settlement ponds to the overflow. These measures will be implemented and maintained during the construction phase to prevent surface water runoff from discharging directly into the local water course.
- Settlement ponds / silt traps as outlined above will be provided to prevent silt runoff into the existing ditches / watercourses during the drainage works.
- Regular testing of surface water discharges will be undertaken at the outfall from the subject lands. Trigger levels for halting works and re-examining protection measures will be: pH >9.0 or pH <6.0; and/or suspended solids
- >25 mg/l. These trigger levels are based on those outlined within 'Guidelines on Protection of Fisheries During Works in and Adjacent to Waters (IFI, 2016)'.
- Where silt control measures are noted to be failing or not working adequately, works will cease in the relevant area.
- All fuels and chemicals will be bunded, and where applicable, stored within double skinned tanks / containers with the capacity to hold 110% of the volume of chemicals and fuels contents. Bunds will be located on flat ground a minimum distance of 50 m from any watercourse or other water conducting features.
- All existing services will be located using service records, GPR surveys and slit pumps to ensure that their position accurately identified before excavation works commence.

Refuelling

Construction plant and equipment will only be parked over-night within the site compound. Construction plant and equipment will be checked daily for any visual signs of oil or fuel leakage, as well as wear and tear.

Fuel will not be stored on site for the duration of the construction phase. Fuel will only be brought to site via mobile fuel bowser. For any liquid other than water, this will include storage in suitable tanks and containers which will be housed in the designated area surrounded by bund wall of sufficient height and construction so as to contain 110 percent (110%) of the total contents of all containers and associated pipework. The floor and walls of the bunded areas will be impervious of all containers and associated pipework. The floor and walls of the bunded area will be impervious to both water and oil. The pipes will vent downwards into the bund.

Where Contractors are required to refuel vehicles, this will only be carried out at the designated refuelling location within the site storage compound, which must employ pollution control mechanisms to prevent escape of fluids to the

river. No refuelling is permitted on site, i.e., within the river or adjacent due to risk of spillage.

The local authority will be informed immediately of any spillage or pollution incident that may occur on-site during the construction phase.

All small plant such as generators and pumps bunded and stood in drip trays capable of holding 110% of their tank contents.

All small plant will be positioned on the bridge itself (within the designated works area – refer to Preliminary Traffic Management Plan), on the secured scaffolding/work platforms, or within the dewatered, 'dry' sections of the dammed river during the works.

Waste oils, empty oil containers and other hazardous wastes will be disposed of in accordance with the requirements of the Waste Management Act, 1996.

Monitoring, Inspection and Record Keeping

The Main Contractor will supervise the sampling of suspended solids downstream prior to commencement of works, and weekly during remediation works. Samples will be analysed on site. Should results show a 10% increase in suspended solids downstream of the site, suitable contingency measures will be instigated.
Routine inspections of construction activities will be carried out on a daily basis by the contractor staff to ensure all controls to prevent environmental impact, relevant to the construction activities taking place at the time, are in place. Environmental inspections will ensure that the works are undertaken in compliance with the Project CEMP and that the requirements of the Conditions of Planning, the NIS and associated documentation are being adhered to during construction.

The Contractor will develop their own site inspection programme, which will include an inspection procedure and relevant forms to record any issues.

Only suitably trained staff will undertake environmental site inspections.

The Main Contractor will keep records of works undertaken.

Prior to and during the construction, the contractor will liaise with the each of the relevant utilities' provider. The contractor will apply for the relevant permit/licence to and comply with each utility providers requirements.
Utility mapping will be carried out in advance of any excavations. Once identified, each utility owner will be notified in advance of any excavation. No excavation adjacent to any unities will be allowed to be carried out without the relevant licence from the utility owner. This is to ensure that there are no interruptions to existing services.

All works near any existing utilities will be carried out in ongoing consultation with the relevant utility company and/or Local Authority and will be in compliance with any requirements or guidelines they may have.

The implementation of the following measures will minimise the effect on the Material Assets/Built Services in the area of the proposed development during the construction phase:

Water Supply Infrastructure

Exclusion zones and setback requirements to the existing trunk watermains have been established in consultation and agreement with Uisce Éireann at pre-application design stage. Construction method statements are to be agreed with IW in advance of a connection agreement or commencement of works.

Specific and detailed cross sections of all built assets crossing the existing watermains have been agreed with Uisce Éireann Asset Management section and are shown on the submitted Pinnacle Engineering Consultants drawings included in the application.

The construction compound's potable water supply will be protected from contamination by any construction activities or materials through the adoption of Uisce Éireann Code of Practice for Water Infrastructure for all temporary installations.

Wastewater Drainage Infrastructure

The wastewater discharge from the site during construction stage is to be managed by a licenced waste disposal contractor in accordance with the agreement of Uisce Éireann.

As construction sites have managed toilet blocks, foul drainage from the construction compound will be removed off site to a licensed facility until the connection to the public foul drainage network has been established.

The overburden thickness, low permeability nature of the till sub-soil and lack of fracture connectivity within the limestone will minimise the rate of off-site migration for any indirect discharges of leaking toilet blocks to ground at the site.

There is a minimal risk of contamination by direct pathway to local watercourses due to the overburden thickness, low permeability nature of the till sub-soil and lack of fracture connectivity within the limestone will minimise the rate of off-site migration for any indirect discharges of leaking toilet blocks to ground at the site.
As such the is no potential for a change in the ground water body status or significant source pathway linkage through the aquifer to any Natura 2000 site due to the overburden thickness, low permeability nature of the till sub-soil and lack of fracture connectivity within the limestone will minimise the rate of off-site migration for any indirect discharges of leaking toilet blocks to ground at the site. Construction of the proposed new foul rising main will be fully coordinated with Uisce Éireann in order to ensure there is no disruption to the users of the existing infrastructure.

All new wastewater pipes/manholes will be laid in accordance with the Uisce Éireann Code of Practice for Wastewater Infrastructure & Standard Details for Wastewater Infrastructure.

All foul drainage infrastructure will be pressure tested and CCTV surveyed in order to reduce the risk of defective or leaking sewers.

In addition to 1 No. gravity connection, it is proposed to drain the site to 2 No. centrally located foul pumping stations, as indicated on Pinnacle Engineering Consultants drawings included in the application. From the pumping stations, foul water will be pumped via 100mm Ø rising mains to the existing foul water line located in Ely View.

The proposed foul pumping stations are to be in accordance with the Uisce Éireann Code of Practice for Wastewater Infrastructure 2017 – Part 5 – Pumping Stations Note that the foul pumping stations are below ground and are proposed to have only 2No.above ground kiosks visible as per the IW standards as per the below extracts from IW

STD-WW-30A and 31A.

The pumping stations have been located to provide the minimum separation distance of 15m to the nearest existing habitable building and the proposed building.

Layout, levels, gradients, pipe sizes and details of the proposed foul drainage infrastructure can be viewed on the Pinnacle Engineering Consultants drawings included in the application.

Surface Water Drainage Infrastructure

The following mitigation measures have been proposed to ensure that no potential adverse effects will arise from construction-related surface water discharges from the Proposed Development. The construction contractor will be required to implement the following specific mitigation measures, for release of hydrocarbons, polluting chemicals, sediment/silt and contaminated waters control:

- Specific measures to prevent the release of sediment over baseline conditions to local water courses and Dublin Bay during the construction work, which will be implemented as the need arises. These measures include, but are not limited to, the use of silt traps, silt fences, silt curtains, settlement ponds and filter materials. This is particularly important when undertaking any works/upgrading to the surface and foul water drainage networks at the Proposed Development site;
- Provision of exclusion zones and barriers (e.g. silt fences) between earthworks, stockpiles and temporary surfaces to prevent sediment washing into the Local water courses and/or existing drainage systems and hence the downstream receiving water environment;
- Silt traps shall not be constructed immediately adjacent to the Local water courses, i.e. a buffer zone between the trap and the watercourse with natural vegetation must be left intact. Imported materials such as terrain, straw bales, coarse to fine gravel should be used either separately or in-combination as appropriate to remove suspended matter from discharges;
- Monitoring shall be carried out on surface water discharge (if necessary and as specified in any Discharge Licence associated with the construction phase of the project);
- Provision of temporary construction surface drainage and sediment control measures to be in place before the construction of the pipeline and/or earthworks commence;
- Weather conditions will be taken into account when planning construction activities to minimise risk of run-off from the site;
- Prevailing weather and environmental conditions will be taken into account prior to the pouring of cementitious materials for the works adjacent to the Local water courses and/or surface water drainage features, or drainage features connected to same.
- Pumped concrete will be monitored to ensure no accidental discharge. Mixer washings and excess concrete will not be discharged to surface water drainage systems.
- Concrete washout areas will be located remote from the Local water courses or any surface water drainage features, where feasible, to avoid accidental discharge to watercourses;
- Any fuels of chemicals (including hydrocarbons or any polluting chemicals) will be stored in a bunded area to prevent any seepage of into the Local water courses, local surface water network or groundwater, and care and attention taken during refuelling and maintenance operations;
- Temporary oil interceptor facilities shall be installed and maintained where site works involve the discharge of drainage water to receiving waters;
- All containment and treatment facilities will be regularly inspected and maintained;

- All mobile fuel bowsers shall carry a spill kit and operatives must have spill response training. All fuel containing equipment such as portable generators shall be placed on drip trays. All fuels and chemicals required to be stored on-site will be clearly marked;
- Implementation of response measures to potential pollution incidents;
- Emergency procedures and spillage kits will be available and construction staff will be familiar with emergency procedures in the event of accidental fuel spillages;
- All trucks will have a built-on tarpaulin that will cover excavated material as it is being hauled off-site and wheel wash facilities will be provided at all site egress points;
- Water supplies shall be recycled for use in the wheel wash. All waters shall be drained through appropriate filter material prior to discharge from the construction sites;
- The removal of any made ground material, which may be contaminated, from the construction site and transportation to an appropriate licenced facility shall be carried out in accordance with the Waste Management Act, best practice and guidelines for same;
- A discovery procedure for contaminated material will be prepared and adopted by the appointed contractor prior to excavation works commencing on site. These documents will detail how potentially contaminated material will be dealt with during the excavation phase; and
- Implementation of measures to minimise waste and ensure correct handling, storage and disposal of waste (most notably wet concrete, pile arisings and asphalt).

Surface water runoff from topsoil stripped areas is to be directed towards on-site settlement ponds. Upstream of the piped surface water outfalls, temporary settlement ponds/filter trench are to be constructed consisting of a geotextile lined stone filled trench with a further inclusion of baled straw filter at the inlet – all to catch any site washed silt during the construction process and before the development is completed. This filter trench is to be inspected and maintained regularly by the contractor throughout the construction stage. Such measures are to be taken to capture, remove and treat sediment prior to discharge of the filtered runoff to the receiving watercourses.

To minimise the adverse effects, the prevailing weather conditions and time of year is to take into account when the site development manager is planning the stripping back of the topsoil. For example, by avoiding excavation and movement of topsoil ahead of any known upcoming heavy rainfall event.

The removal of the topsoil layer will be carried out in a carefully managed process and in coordination with the construction phasing management of the development.

Sand, gravel or other loose materials brought to the site shall be stored in locations a minimum of 10m from any local water course and are not to be positioned where rainfall run-off could wash silt towards the watercourse. Any cement is to be stored in bags under cover from the elements at a location remote from the watercourse.

The site layout shall be such that it includes a dedicated set down area for deliveries to the site and temporary storage of construction materials. The area is to be clearly demarcated and managed to avoid haphazard placement of materials throughout the site.

The set down location shall be managed to ensure it is well ordered and tidy in line with good site management practice.

A Construction Management Plan will be prepared by the appointed Main Contractor. The use of construction best practices is to take place to avoid the risk of contamination of the receiving watercourses or ground water.

Preconstruction meetings to be held with all sub-contractors to explain works method statements and site management practices. Periodic, documented inspections of the site and subcontractor activities are to be carried out to improve overall site safety, efficiency and mitigate the risk of pollution of the stream or groundwater.

Subcontractor method statements will be formally reviewed to ensure that comply with the requirements of the Construction Regulations 2006 and the Construction Management Plan.

The site supervisor will conduct documented site inspections, using a Site Inspection Checklist on a weekly basis, or greater to ensure compliance. Potential spillages from storage tanks must not be allowed to seep into the ground and Spill kits are to be made available.
An Outline Construction Management will be developed and will be implemented during the construction phase. This will include Site personnel inductions to ensure all site personnel are made aware of the procedures and best practice with regards to the management of surface water runoff and ground water protection.

Concrete batching will take place off site and wash out of concrete trucks will take place off site (at authorized concrete batching plant in full compliance with relevant planning and environmental consents).

Wheel wash down facilities will be provided in specifically designated areas and managed in accordance with the OCMP. Discharge from these areas will be directed into settlement/treatment areas and this will prevent uncontrolled runoff site.

All fuel stored will be bunded within a secure hardstanding area with strict management control and access to same. Bunding is to be 100% + 10% of the volume stored.

Fuel spill clean-up kits will be kept in the designated re-fuelling areas.

Topsoil stockpiles will be located in such a manner as to minimise the risk of washing away into local drainage or watercourses.

The contractor will have a full time Site Manager responsible for the site management. The Manager will be fully aware of the relevance of the works in relation to the watercourse and will ensure all staff on site are made aware. A site noticeboard will be positioned in a suitably located prominent location on the site with the contact details of the person responsible for ensuring the pollution prevention methodology.

The construction management of this project will incorporate protection measures to minimise as far as possible the risk of spillage that could lead to surface and ground contamination.

Dewatering of trenches should be used where deemed necessary and cannot be avoided and all run off from dewatering areas is to be directed to the designated settlement/treatment areas.

Electrical Supply

The locations of the electricity network infrastructure relative to the proposed works will be confirmed as part of the Detailed Design Phase.

The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with ESB Networks.

Prior to excavation the Contractor will carry out additional site investigation, including slit trenches, in order to determine the exact location of the electricity network in close proximity to the works area. This will ensure that the underground electricity network will not be damaged during the construction phase.

All works in the vicinity of ESB Networks infrastructure will be carried out in ongoing consultation with ESB Networks and will be in compliance with any requirements or guidelines they may have including procedures to ensure safe working practices are implemented when working near live overhead/underground electrical lines.

Telecommunications

The locations of the telecommunications network infrastructure relative to the proposed works will be confirmed as part of the Detailed Design Phase.

The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with the relevant telecommunication provider.

Prior to excavation the Contractor will carry out additional site investigation, including slit trenches, in order to determine the exact location of the telecommunications network in close proximity to the works area. This will ensure that the underground telecommunications network will not be damaged during the construction phase.

All works in the vicinity of the telecommunications provider's infrastructure will be carried out in ongoing consultation with the relevant provider and will be in compliance with any requirements or guidelines they may have.

- Where new services are required, the Contractor will apply to the relevant provider for a connection permit where appropriate and will adhere to their requirements.
- It is considered that any likely impacts to overhead cables in the vicinity will be mitigated by applying standard construction practices.

Operational Phase

Water Supply Infrastructure

Usage of low flush toilets will reduce the demand on the public water supply infrastructure and the wastewater infrastructure.

Wastewater Drainage Infrastructure

Operational waste will be removed from the completed development using only licenced contractors to appropriately licensed facilities.

The wastewater drainage infrastructure has been designed in accordance with the Uisce Éireann Code of Practice for Wastewater Infrastructure.

The foul pump stations will be located as indicated in the Pinnacle Engineering Consultants drawings included in the application, fitted with a pump system complete as per the Uisce Éireann Standard Detail, STD-WW- 28A-Rev2. The pumping stations will be designed in accordance with the IW COP and includes real time remote monitoring, alarms and telemetry connected to the SDCC pumping station control centre using a "SCADA" system.

The pumping stations have also been designed to incorporate a duty and stand-by duty pump in case of failure of any single pump. Furthermore, the pumping stations can accommodate 24hrs overflow storage below ground in the chamber designed. Refer to Pinnacle Engineering Consultants drawings included in the application for further detail. Watermain supply to the site is to be monitored by Uisce Éireann using the required and designed flow meters as have

been approved under the IW SDC design review. Refer to the submitted Pinnacle Engineering Consultants drawings included in the application for location of same.

Surface Water Drainage Infrastructure

As detailed in Chapter 7 "Water", the implementation of the following measures will minimise the impact on the Hydrology and Water Services in the area of the proposed development during the operational phase of the development.

The surface water collected from the project has been designed in accordance with the CIRIA SuDS Manual and the Greater Dublin Strategic Drainage Study and the appropriate treatment train process has been applied in the design.

Regular maintenance of all SuDS features by the development management team will be carried out until such a stage that the Local Authority take in charge the project.

The road and block levels design has been carried out following the existing natural site contours and replicating where possible the natural flow paths.

In accordance with best practice, appropriate SuDS features included in this development include filter drains, roadside filter swales, permeable paving in parking bays, green roofs, tree pits, bioretention area, buildings, silt-trap/catchpit manholes, permeable geocellular attenuation storage, vortex flow control limiting devices and petrol interceptors.

The surface water drainage infrastructure has been designed to allow for a 20% increase in rainfall due to climate change in accordance with the GDSDS.

The surface water runoff from the site will be limited to the greenfield runoff rate and the attenuated flows are to be stored in detention basins in accordance with the GDSDS. Further detailed information relating to the site development drainage and water infrastructure is outlined in a separate document prepared by Pinnacle Engineering Consultants entitled "Engineering Planning Report".

All designated waste storage areas will have gullies connected to the foul drainage network to facilitate wash down as required.

Electrical Supply

The power demands during the operational phase on the existing electricity network are considered to be imperceptible due to the energy efficient design including LED lighting, high performance heating equipment.
The design and construction of the required electrical services infrastructure in accordance with the relevant guidelines and codes of practice is likely to mitigate any potential effects during the operational phase of the development, with the exception of any routine maintenance of the site services.

Telecommunications

The telecommunications demand during the operational phase on the existing telecommunications network are considered to be imperceptible due to the resilience built into the networks by the relevant providers.
The design and construction of the required Telecommunication services infrastructure in accordance with the relevant guidelines and codes of practice is likely to mitigate any potential effects during the operational phase of the development, with the exception of any routine maintenance of the site services.

17.3.9.2 Monitoring

Water Supply Infrastructure

Metering will allow the water supply to the development to be monitored, this is to be done to the requirements of Uisce Éireann / South Dublin County Council.

Wastewater Drainage Infrastructure

Construction Phase

Monitoring during the Construction Phase of the development will consist of the following:

- Normal quality control inspection of the works;
- Monitoring of discharges to the existing network is also required by South Dublin County Council to ensure that no unauthorised discharges are occurring;
- Pressure testing and CCTV inspections of the foul sewers following completion of stages of the construction is recommended to ensure that the required construction standards are being maintained;
- Upon completion of the development, monitoring of the discharges from the development will be undertaken as required.

Operational Phase

During the operational phase the proposed development will operate in accordance with the current limits set out in the Engineering Planning Report, as permitted by Uisce Éireann . Therefore, no monitoring of foul effluent from the development is considered to be necessary.

Surface Water Drainage Infrastructure

Construction Phase

Monitoring during the Construction Phase of the development should consist of the following:

- Normal quality control inspection of the works.
- Monitoring of possible discharges to the existing culverted watercourse at its outfall may also be required by SDCC to ensure that no unauthorised discharges are occurring.
- Pressure testing and CCTV inspections of the surface water drains following completion of stages of the construction is recommended to ensure that the required construction standards are being maintained.
- Upon completion of the development, monitoring of the discharges from the development will be undertaken as required.

Operational Phase

Monitoring during the operational phase of the development is recommended as follows:

- All filters, silt traps, hydro-brakes and overflows should be inspected regularly and in particular after heavy rainfall events to ensure that they are not blocked.
- Gullies in the public road should be inspected and cleaned as required

- Pollutants which accumulate within the oil petrol interceptor on site should be regularly monitored and removed as necessary.

17.3.10. Electrical Supply

The electricity network will be monitored by ESB networks.

17.3.11. Telecommunications

Telecoms will be monitored by EIR.

Material Assets: Transportation

17.3.12. Mitigation Measures

Construction Phase

The successful completion of the Proposed Development will require significant coordination and planning, and a comprehensive set of mitigation measures will be put in place before and during the construction phase to minimise the effects of the additional traffic generated by the Proposed Development. The range of measures will include the following which are also set out in the submitted Construction Traffic Management Plan, which is enclosed with this LRD planning application as a separate document.

- A detailed **Construction Traffic Management Plan (CTMP),** incorporating all the mitigation measures set out in the TMP submitted as part of the CTMP, will be finalised and agreed with the relevant road authorities and An Garda Síochána prior to construction works commencing on site. The detailed TMP will include the following:
- **Traffic Management Coordinator** – a competent Traffic Management Co-ordinator will be appointed for the duration of the project and this person will be the main point of contact for all matters relating to traffic management.
- **Communications**: Local residents in the area will be informed of any upcoming traffic related matters e.g., temporary lane/road closures (if required), via letter drops and door knocks. Information will include the contact details of the Contract Project Co-ordinator, who will be the main point of contact for all queries from the public or Local Authority during normal working hours. An "out of hours" emergency number will also be provided.
- **Travel Plans** – Given the site location, the assessment above has assumed the worst case i.e., that construction workers will drive to the site. The Main Contractor will be required to provide a travel plan for construction staff, which will include the identification of routes to / from the site and identification of an area for parking.

<u>Site Access and Egress</u>

Site access will be provided via the new Link Street on to Oldcourt Road and Bohernabreena Road. These will coincide with the future development access.

An access gate will be provided during the construction phase off the Link Street from Oldcourt Road and Bohernabreena Road.

The contractor shall provide advanced warning signs, in accordance with Chapter 8 of the Department of the Environment's Traffic Signs Manual 2019, on the approach to proposed site access locations a minimum of one week prior to construction works commencing at the site.

There will be heras fencing secured to a minimum height of 2 metres alongside the construction compound areas or solid panel hoarding in areas with high/low viewing panels to help reduce unauthorised access to the construction compound.

This fence will be checked daily and maintained as necessary, and it will be the responsibility of the Site Manager to open and lock the gates each working day to ensure the site is not left open and unattended at any time.

Access to the construction site will be limited to authorised persons. The site will be secured at all times with security being employed by the main contractors to ensure no unauthorised access.

Where possible, construction traffic and non-construction traffic will be separated for all modes of transport. Where the construction programme requires mixing of traffic, additional temporary traffic management measures will be put in place.

National Road Network

Access to the site along the National Road Network will be via the M50. It is anticipated that the majority of construction related traffic will travel along the M50 at which point construction traffic will enter the regional/local road network i.e., R113

Regional & Local Road Network

The majority of access / egress to proposed sites shall be facilitated from the local road networks. To mitigate against possible restrictions in visibility requirements, it is proposed that the contractor shall use a safe system of permanent flag men for the control of traffic during all access / egress operations at each site location, if required. The site marshal, referred to above, will be responsible for this.

The site will be accessed via 2 No. access points via the Oldcourt Road and an Bohernabreena Road. These roads will be accessed via the Link Street.

The contractor shall utilise a safe system of permanent flag men for the control of traffic during all access / egress operations at each site location outlined above. The site marshal, referred to above, will be responsible for this.

The proposed Access from Link Street will be used for works traveling via public transport.

Access

Access to the site will be in the location of the proposed development accesses each of which will be accessed via the Link Street. The contractor will ensure a visibility splay that is appropriate for the local speed limit.

Local Schools

Haulage routes will avoid passing local schools at the start and end of the school day.

Signage

The contractor shall undertake consultation with the relevant authorities for the purpose of identifying and agreeing signage requirements. Such signage shall be installed prior to works commencing on site.

Proposed signage may include warning signs to provide warning to road users of the works access / egress locations and the presence of construction traffic. All signage shall be provided in accordance with the Department of Transport's Traffic Signs Manual, Chapter 8 – Temporary Traffic Measures and Signs for Roadworks.

In summary, the contractor will be required to ensure that the following elements are implemented:

- Consultation with the relevant authorities for the purpose of identifying and agreeing signage requirements.
- Provision of temporary signage indicating site access route and locations for contractors and associated suppliers; and
- Provision of general information signage to inform road users and local communities of the nature and locations of the works, including project contact details.

Traffic management for road works

The Applicant is currently reviewing the positions of any incoming services that maybe affect as a result of the proposed development. This will be done in conjunction with the relevant service providers.

If work must be done in the Public Highway the Main Contractor will ensure that the Main Contractor obtains the necessary licences and permits in time for the works to proceed on time.

The Main Contractor will procure street works accredited and approved contractors to carry out the utility works. In accordance with plans and drawings submitted to the planning authority, and subject to the necessary approval of Uisce Éireann and in agreement with the Roads and Transport Department of the Local Authority (SDCC).
A specific Traffic Management Plan (TMP) will be required by the Local Authority in conjunction with the application for a road opening licence, in advance of carrying out these road works. The TMP design and service will be provided by an independent specialist and will deal with the efficient management of traffic and pedestrians, mitigating all potential safety risks to users, whilst maintaining effective operation of the carriageway.

Pedestrians

Hoarding will be checked daily with a weekly thorough inspection. Any defects will be attended to immediately.

The Main Contractor will ensure that there is adequate protection in place to prevent concrete splashing beyond the site boundary when the concrete slabs are being poured. The Main Contractor will carry out a task specific briefing prior to every pour above ground level.

The gateman and traffic marshals will ensure public safety when vehicles are entering and exiting the site. The public will not be allowed to access the site unless they follow the dedicated pedestrian access route on to site. They will be fully protected with appropriate PPE until they reach the security cabin. There is no unauthorised access beyond this point.

Programming

In order to reduce impacts on local communities and residents adjacent to the proposed sites, it is proposed that:

- The contractor will be required to liaise with the management of other construction projects and the Local Authorities to co-ordinate deliveries.
- The contractor will be required to schedule deliveries in such a way that construction activities and deliveries activities do not run concurrently e.g., avoiding pouring of concrete on the same day as material deliveries in order to reduce the possibility of numbers of construction delivery vehicles arriving on site simultaneously, resulting in build-up of traffic on the road network.
- The contractor will be required to schedule deliveries to and from the proposed site such that traffic volumes on the surrounding road network are kept to a minimum.
- HGV deliveries to the Proposed Development site will be suspended on the days of any major event in the area that have the potential to cause larger than normal traffic volumes.
- The contractor will be required to interact with members of the local community to ensure that deliveries will not conflict with sensitive events such as funerals.
- HGV deliveries will avoid passing schools at opening and closing times where it is reasonably practicable.
- Deliveries of materials to site will generally be between the hours of 08:00 and 19:00 Monday to Friday, and 08:00 to 14:00 on Saturdays. No deliveries will be scheduled for Sundays or Bank Holidays. There may be occasions where it is necessary to make certain deliveries outside these times, for example, where large loads are limited to road usage outside peak times.

The construction period for the Proposed Development is anticipated to be approximately 18 months from the commencement of the site works. This is subject to change and dependent on market conditions.

Recommended Traffic Management Speed Limits

Adherence to posted/legal speed limits will be emphasised to all staff/suppliers and contractors during induction training.

Drivers of construction vehicles/HGVs will be advised that vehicular movements in locations, such as local community areas, shall be restricted to 50km/h. Special speed limits of 30km/h shall be implemented for construction traffic in sensitive areas such as school locations. Such recommended speed limits will only apply to construction traffic and shall not apply to general traffic. It is not proposed to signpost such speed limits in the interest of clarity for local road users.

Spoil

Spoil will be removed from site using 8-wheeler muck away lorries. The lorries will arrive at site and will be marshalled onto the site by the traffic marshals. The lorries will be loaded with an excavator. The lorries will be covered prior to leaving site. The traffic marshal will escort the vehicle off site and once the vehicle is on its way, the next vehicle will be called in.

Road Cleaning

It shall be a requirement of the works contract that the contractor will be required to carry out road sweeping operations to remove any project related dirt and material deposited on the road network by construction/delivery vehicles. All

material collected will be disposed to a licensed waste facility.

Road Condition

The extent of the heavy vehicle traffic movements and the nature of the payload may create problems of:

- Fugitive losses from wheels, trailers or tailgates; and
- Localised areas of subgrade and wearing surface failure.

The contractors shall ensure that:

- Loads of materials leaving each site will be evaluated and covered if considered necessary to minimise potential dust impacts during transportation.
- The transportation contractor shall take all reasonable measures while transporting waste or any other materials likely to cause fugitive losses from a vehicle during transportation to and from site, including but not limited to:
    - Covering of all waste or material with suitably secured tarpaulin/ covers to prevent loss.
    - Utilisation of enclosed units to prevent loss; and
    - The roads forming part of the haul routes will be monitored visually throughout the construction period and a truck mounted vacuum mechanical sweeper will be assigned to roads along the haul route as required.

In addition, the contractor shall, in conjunction with the Local Authority:

- Undertake additional inspections and reviews of the roads forming the haul routes one month prior to the construction phase to record the condition of these roads at that particular time.
- Such surveys shall comprise, as a minimum, a review of video footage taken at that time, which shall confirm the condition of the road corridor immediately prior to commencement of construction. This shall include video footage of the road wearing course, the appearance and condition of boundary treatments and the condition of any overhead services that will be crossed. Visual inspections and photographic surveys will be undertaken of bridges and culverts that are along the haul roads.
- Where requested by the Local Authority prior to the commencement of construction operations, pavement condition surveys will also be carried out along roads forming part of the haul route. These will record the baseline structural condition of the road being surveyed immediately prior to construction.

- Throughout the course of the construction of the Proposed Development, on-going visual inspections and monitoring of the haul roads will be undertaken to ensure any damage caused by construction traffic is recorded and that the relevant Local Authority is notified. Arrangements will be made to repair any such damage to an appropriate standard in a timely manner such that any disruption is minimised.

Upon completion of the construction of the Proposed Development, the surveys carried out at preconstruction phase shall be repeated and a comparison of the pre and post construction surveys carried out. Where such comparative assessments identify a section of road as having been damaged or as having deteriorated as a result of construction traffic, the construction related damage will be repaired.

Vehicles

The following is a non-exhaustive list of possible vehicles that will be used:

- Abnormal Load HGV.
- HGV.
- Rigid Truck.
- Box Van.
- Panel Van.
- Concrete Truck.
- Concrete Pump Truck.
- Mobile Crane (various sizes).
- JCB (various sizes).
- Excavators (various sizes).
- Dump Truck.
- Specialist vehicles maybe required on occasion; and
- Details of size and weights of vehicles will be confirmed on appointment of a Main Contractor.

Dust and Dirt Control

The contractor will be obliged to implement the mitigation measures outlined in the EIAR Chapter 8: Air Quality Chapter in respect of dust / dirt control.

Noise Control

The contractor will be obliged to implement the mitigation measures outlined in the EIAR Chapter 10: Noise and Vibration in respect of noise control.

Protection of Surface Waters

The contractor will be obliged to implement the mitigation measures outlined in the Hydrology Chapter of EIAR in respect of the protection of the surface water.

Co Ordination

The Main Contractor will establish a holding area on the site that could accommodate up to 2 concrete trucks, the Main Contractor will also provide a traffic marshal at the site. The holding area will be utilised to prevent congestion of the Link Street from construction traffic.

All vehicles will be tracked by the traffic marshals who will report back to the logistics manager. The logistics manager will control the deliveries with help from the traffic marshals and the gateman. Unscheduled vehicles will be turned away. If deliveries are taking longer to offload, then the following deliveries will be notified of any timing issues.

A copy of the delivery schedule will be issued to the traffic marshals, gateman and contractors' supervisors every

morning so that everyone is aware and can make provision for when their delivery arrives.

The traffic marshals will be trained and competent and they will undergo ongoing assessments by the logistics manager to ensure that they are carrying out their duties with due care diligence.

Refuelling

Construction plant and equipment will only be parked over-night within the site compound. Construction plant and equipment will be checked daily for any visual signs of oil or fuel leakage, as well as wear and tear.

Fuel will not be stored on site for the duration of the construction phase. Fuel will only be brought to site via mobile fuel bowser. For any liquid other than water, this will be stored in suitable tanks and containers which will be housed in the designated area surrounded by bund wall of sufficient height and construction so as to contain 110 percent (110%) of the total contents of all containers and associated pipework. The floor and walls of the bunded area will be impervious to both water and oil. The pipes will vent downwards into the bund.

Where Contractors require to refuel vehicles, this will only be carried out at the designated refuelling location within the site storage compound, which must employ pollution control mechanisms to prevent escape of fluids to the river. No refuelling is permitted on site, i.e., within the river or adjacent due to risk of spillage.
The Local Authority will be informed immediately of any spillage or pollution incident that may occur on-site during the construction phase. Spill kits will be maintained on site at all times.

All small plant such as generators and pumps bunded and stood in drip trays capable of holding 110% of their tank contents.

Waste oils, empty oil containers and other hazardous wastes will be disposed of in accordance with the requirements of the Waste Management Act, 1996.

Site Tidiness and Housekeeping

Construction works will be carried out according to a defined schedule agreed with the client and the relevant contractors, with regard to the hours of work outlined above. Any delays or extensions required will be notified at the earliest opportunity to the client and Contractors.

Contractors will ensure that road edges and footpaths are swept on a regular basis.

Any and all waste materials arising during the works will either be immediately taken to a location from which discharge to local water courses cannot take place, or temporarily stored/covered to prevent washout.

All Contractors will be responsible for the clearance of their plant, equipment and any temporary buildings upon completion of construction. The site will be left in a safe condition.

Monitoring, Inspection and Record Keeping

The contractor will be obliged to implement the mitigation measures outlined in the Construction and Environmental Management Plan and the Construction Traffic Management Plan with respect to monitoring, inspections and record keeping.

Road Closures

During the course of the works, it is not anticipated that road closures will be required for any extended period of time. Temporary or partial road closures may be required to facilitate utility connections such as watermain, foul water, surface water, etc.

Should works be required on the external road network, road opening licences will be sought from the Local Authority via the Road Management Office.

In areas where existing carriageways are narrow, it is anticipated that Temporary Traffic Management measures such as temporary traffic lights will be utilised to facilitate traffic.

Enforcement of Construction Traffic Management Plan

All project staff and material suppliers will be required to adhere to the CTMP (which is a live document). As outlined above, the contractor shall agree and implement monitoring measures to confirm the effectiveness of the CTMP.

Details of Working Hours and Days

All deliveries will be notified to the Contractor's Project Manager/Traffic Management Co-ordinator in advance with specific times identified. These will be collated and held in a diary by the Co-ordinator who will manage the deliveries daily . The Co-ordinator will highlight any clashes and anticipated busy periods to streamline the processing of deliveries.

On arrival at the agreed locations, drivers must wait and ring for attention in accordance with the relevant site signage. They will then be escorted to the appropriate location for unloading by the contractor's Banksmen.
Unloading will be carried out at one of the material storage areas. All deliveries, where possible, must be able to be unloaded by forklift or mechanical means.

Site development and building works shall be carried out only between the hours of 0700 to 1900 Mondays to Fridays inclusive, between 0800 to 1400 hours on Saturdays and not at all on Sundays and public holidays.
There may be occasions where it is necessary to make certain deliveries outside these times, for example, where large loads are limited to road usage outside peak times. Where possible, advance warning will be given to South Dublin County Council in writing if construction activities occur outside of these hours. These will be kept to a minimum.

All access roads used by contractors will be monitored for mud and any construction materials and cleared using a shovel and broom and if required a mechanical road sweeper.

Emergency Procedures During Construction

The contractor shall ensure that unobstructed access is provided to all emergency vehicles along all routes and site accesses. The contractor shall provide to the local authorities and emergency services, contact details of the contractor's personnel responsible for construction traffic management. In the case of an emergency the following procedure shall be followed:

- Emergency Services will be contacted immediately by dialling 112.
- Exact details of the emergency / incident will be given by the caller to the emergency line operator to allow them to assess the situation and respond in an adequate manner.

- The emergency will then be reported to the Site Team Supervisors and the Safety Officer. All construction traffic shall be notified of the incident (where such occurs off site).
- Where required, appointed site first aiders will attend the emergency immediately; and
- The Safety Officer will ensure that the emergency services are en-route.

Complaints Handling

The Main Contactor will maintain a log of site complaints detailing:

- Name and address of complainant
- Time and date complaint was made.
- Likely cause or source of nuisance
- Weather conditions, such as wind speed and direction
- Investigative and follow -up actions.

The Main Contractor will appointment a Liaison Officer as a single point of contact to engage with the local community and respond to concerns. It will be the role of the Liaison Officer to keep local residents and businesses informed of progress and timing of particular construction activities that may impact on them.

Communication

The contractor shall ensure that close communication with the relevant local authorities and the emergency services shall be maintained throughout the construction phase. Such communications shall include:

- Submissions of proposed traffic management measures for comment and approval.
- On-going reporting relating to the condition of the road network and updates to construction programming; and
- Information relating to local and community events that could conflict with proposed traffic management measures and construction traffic in order to implement alternative measures to avoid such conflicts.

The contractor shall also ensure that the local community is informed of proposed traffic management measures in advance of their implementation. Such information shall be disseminated by posting advertisements in local newspapers and delivering leaflets to houses in the affected areas. Such information shall contain contact information for members of the public to obtain additional information and to provide additional knowledge such as local events, sports fixtures, etc., which may conflict with proposed traffic management measures.

Operational Phase

Vehicular access to the development will be via 4 no. access points, as follows: (i) from the west of the site via 2 no. accesses located off Bohernabreena Road, (ii) from the north of the site via 1 no. access at Dodderbrook Place, and (iii) from Oldcourt Road (the R113) to the east, via adjoining residential development. The proposed development includes for pedestrian and cyclist connections and accesses to adjoining lands to the north, east and west, and includes for cycling and pedestrian routes and infrastructure throughout the development.

The normal function of traffic lights requires more than sight control and coordination to ensure that traffic and pedestrians move as smoothly, and safely as possible.

For signal-controlled junctions all arms are controlled by traffic lights that indicate which approach has the right of way

at any given time. This ensures that side road traffic is given the opportunity to cross/join the main road flow. It also allows pedestrians and cyclists to cross along the desire lines in a safe and controlled manner.

Dedicated infrastructure will be provided for pedestrians, cyclists and other vulnerable road users. Were possible, this infrastructure will separate vehicles from pedestrians, cyclists and other vulnerable road users reducing the possibility of a road traffic collision occurring.

Where vehicles interact with pedestrians, cyclists and other vulnerable road users it will be done in a controlled manner. To that end, the proposed development includes a number of controlled crossings such as the signal-controlled junction from the Link Street to Oldcourt Road and Bohernabreena Road. Along the Link Street, a signal-controlled crossing has also been provided, linking the southern side of the development to the northern side.

Dedicated separated cycle infrastructure is provided along the Link Street with controlled crossings provided to accommodate cycling desire lines including to adjoining developments. Cyclist will share road space in areas of low traffic volume and low speed.

A number of uncontrolled crossings are provided throughout the development for pedestrians. These uncontrolled crossings have been designed to accommodate persons with visual impairments and mobility impairments. Pedestrians are given priority across junctions from the Link Street along the cycle track.

Monitoring

The proposed construction material haul routes will be monitored during the construction phase to identify any damage which may have been caused by construction traffic.

In order to monitor this, the Main Contractor, in conjunction with the Local Authority shall ensure the following:

- Undertake additional inspections and reviews of the roads forming the haul routes one month prior to the construction phase to record the condition of these roads at that particular time.
- Such surveys shall comprise, as a minimum, a review of video footage taken at that time, which shall confirm the condition of the road corridor immediately prior to commencement of construction. This shall include video footage of the road wearing course, the appearance and condition of boundary treatments and the condition of any overhead services that will be crossed. Visual inspections and photographic surveys will be undertaken of bridges and culverts that are along the haul roads.
- Where requested by the Local Authority prior to the commencement of construction operations, pavement condition surveys will also be carried out along roads forming part of the haul route. These will record the baseline structural condition of the road being surveyed immediately prior to construction.
- Throughout the course of the construction of the Proposed Development, on-going visual inspections and monitoring of the haul roads will be undertaken to ensure any damage caused by construction traffic is recorded and that the relevant Local Authority is notified. Arrangements will be made to repair any such damage to an appropriate standard in a timely manner such that any disruption is minimised.

Upon completion of the construction of the Proposed Development, the surveys carried out at preconstruction phase shall be repeated and a comparison of the pre and post construction surveys carried out. Where such comparative assessments identify a section of road as having been damaged or as having deteriorated as a result of construction traffic, as mentioned, the construction related damage will be repaired.

17.3.13. Material Assets: Resource and Waste Management

17.3.13.1 Mitigation Measures

This section outlines the measures that will be employed in order to reduce the amount of waste produced, manage the wastes generated responsibly and handle the waste in such a manner as to minimise the effects on the environment. The concept of the 'circular economy and 'waste hierarchy' are employed when considering all mitigation measures. The CE is a sustainable alternative to the traditional linear (take-make-dispose) economic model, reducing waste to a minimum by reusing, repairing, refurbishing and recycling existing materials and products. While the waste hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling / recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal.

Construction Phase

The following mitigation measures will be implemented during the construction phase of the proposed development:
As previously stated, a project specific RWMP has been prepared in line with the requirements of the requirements of the EPA 'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021) and is included as Appendix 13.1. The mitigation measures outlined in the RWMP will be implemented in full and form part of the mitigation strategy for the site. The mitigation measures presented in this RWMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the excavation and construction phases of the proposed development.

- Prior to commencement, the appointed Contractor(s) will be required to refine / update the RWMP (Appendix 13.1) in agreement with SDCC and in compliance with any planning conditions, or submit an addendum to the RWMP to SDCC, detailing specific measures to minimise waste generation and resource consumption, and provide details of the proposed waste contractors and destinations of each waste stream.
- The Contractor will implement the RWMP throughout the duration of the proposed excavation and construction phases.
- A quantity of topsoil and sub soil will need to be excavated to facilitate the proposed development. The project engineers (Pinnacle) have estimated that the majority excavated material will need to be removed off-site. Correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers as well as on water and soil environments, both on and off-site.
- In addition, the following mitigation measures will be implemented:
- Building materials will be chosen to 'design out waste';
- On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery. The following waste types, at a minimum, will be segregated:
    - Concrete rubble (including ceramics, tiles and bricks);
    - Plasterboard;
    - Metals;
    - Glass; and
    - Timber.
- Left over materials (e.g. timber off-cuts, broken concrete blocks / bricks) and any suitable construction materials shall be re-used on-site, where possible; (alternatively, the waste will be sorted for recycling, recovery or disposal);
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site;
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);

- A Resource Manager will be appointed by the main Contractor(s) to ensure effective management of waste during the excavation and construction works;
- All construction staff will be provided with training regarding the waste management procedures;
- All waste leaving site will be reused, recycled or recovered, where possible, to avoid material designated for disposal;
- All waste leaving the site will be transported by suitably permitted contractors and taken to suitably registered, permitted or licenced facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with Regulation 27 (By-products), as amended, European Union (Waste Directive) Regulations 2011-2020. EPA approval will be obtained prior to moving material as a by-product.
These mitigation measures will ensure that the waste arising from the construction phase of the proposed development is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations and the Litter Pollution Act 1997 and the NWCPE. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will promote more sustainable consumption of resources.

Operational Stage

The following mitigation measures will be implemented during the operational phase of the proposed development:

All waste materials will be segregated into appropriate categories and will be temporarily stored in appropriate bins or other suitable receptacles in a designated, easily accessible areas of the site.

As previously stated, a project specific OWMP has been prepared and is included as Appendix 13.2. The mitigation measures outlined in the OWMP will be implemented in full and form part of the mitigation strategy for the site. Implementation of this OWMP will ensure a high level of recycling, reuse and recovery at the development. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus achieving the targets set out in the NWMPCE , Waste Action Plan for a Circular Economy – Waste Management Policy in Ireland and the SDCC waste bye-laws.

The Facilities Management Company / Residents and Tenants of the site during the operational phase will be responsible for ensuring – allocating personnel and resources, as needed – the ongoing implementation of this OWMP, ensuring a high level of recycling, reuse and recovery at the site of the proposed development.
In addition, the following mitigation measures will be implemented:

- On-site segregation of all waste materials into appropriate categories including (but not limited to):

  - Organic waste;
  - Dry Mixed Recyclables;
  - Mixed Non-Recyclable Waste;
  - Glass;
  - Waste electrical and electronic equipment (WEEE);
  - Batteries (non-hazardous and hazardous);
  - Cooking oil;
  - Light bulbs;
  - Cleaning chemicals (pesticides, paints, adhesives, resins, detergents, etc.);
  - Furniture (and from time to time other bulky waste); and
  - Abandoned bicycles.

- The Facilities Management Company / Residents and Tenants will ensure that all waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials.
- The Facilities Management Company / Residents and Tenants will ensure that all waste collected from the Site of the proposed development will be reused, recycled or recovered, where possible, with the exception of those waste streams where appropriate facilities are currently not available; and
- The Facilities Management Company / Residents and Tenants will ensure that all waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities.

These mitigation measures will ensure the waste arising from the development is dealt with in compliance with the provisions of the *Waste Management Act 1996*, as amended, associated Regulations, the *Litter Pollution Act 1997*, *The NWMPCE* and the SDCC waste bye-laws. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved.

17.3.14. Monitoring

The management of waste during the construction phase will be monitored by the Contactor's appointed Resource Manager to ensure compliance with the above-listed mitigation measures, and relevant waste management legislation and local authority requirements, including maintenance of waste documentation.
The management of waste during the operational phase will be monitored by the Operator / Facilities Management to ensure effective implementation of the OWMP internally and by the nominated waste contractor(s).

Likely Significant Effect	Monitoring Proposals
Litter Pollution	The Contractor will review and maintain waste records and site audits
Unlicensed Waste Collection (Illegal Dumping)	A register will be maintained and reviewed. A copy of all waste collection permits will be maintained.
Insufficient Waste Facilities	A register will be maintained and reviewed. A copy of all waste collection permits will be maintained.
Lack of waste Classification	An appointed Resource Manager will monitor all on-site waste segregation and classification

Table 17-7: Monitoring Proposals for Construction Phase

Likely Significant Effect	Monitoring Proposals
Unlicensed Waste Collection (Illegal Dumping)	The operator/ facilities management company will maintain waste receipts on-site for a period of 7 years and make available to SDCC as requested.
Poor Waste Segregation	Waste generation volumes will be monitored by the operator / facilities management company
Litter Pollution	Waste storage areas will be monitored by the operator / facilities management company

Table 17-8: Monitoring Proposals for Operational Phase

Construction Stage

The objective of setting targets for waste management is only achieved if the actual waste generation volumes are calculated and compared. This is particularly important during the excavation and construction works, where there is a potential for waste management objectives to become secondary to other objectives, i.e. progress and meeting construction schedule targets. The mitigation measures in the RWMP specify the need for a Resource Manager to be appointed, who will have responsibility for monitoring the actual waste volumes being generated and ensuring that contractors and sub-contractors are segregating waste as required. Where targets are not being met, the Resource Manager will identify the reasons for this and work to resolve any issues. Recording of waste generation during the construction phase of the proposed development will enable better management of waste contractor requirements and identify trends. The data should be maintained to advise on future developments.

Operational Stage

During the operational phase, waste generation volumes will be monitored by the Facilities Management against the predicted waste volumes outlined in the OWMP. There may be opportunities to reduce the number of bins and equipment required in the shared WSAs, where estimates have been too conservative. Reductions in bin and equipment requirements will improve efficiency and reduce waste contractor costs.

17.3.15. Archaeology and Cultural Heritage

Mitigation Measures

This assessment has demonstrated that the study area is located in a rich archaeological landscape, with nearby archaeological monuments dating to prehistoric, Medieval, and Early Modern periods. Additionally, nearby excavations have discovered archaeological features which demonstrate continuous inhabitation of this area of the South Dublin uplands since the Neolithic period. Geophysical survey has identified three areas with potential archaeological features, however, there is low confidence in these interpretations. These features include one possible pit-type feature, as well as two areas of possible plough-damaged linear and curvilinear features. The features identified by geophysical survey do not substantial archaeological sites such as Early Medieval ringforts, ecclesiastical sites, or significant burial grounds. As such, pre-development testing of these features is not necessary.

As such, a programme of archaeological testing should be carried out targeting those area which have been identified by geophysical survey. This programme should aim to identify any subsurface archaeological remains and the horizontal extent of any such remains.

A report on the results of the testing programme should be submitted to the City Archaeologist and the National Monuments Service following the completion of the works. This recommendation is subject to the approval of the City Archaeologist and the National Monuments Service.

17.3.16 The Landscape

Mitigation Measures

The proposed development forms an extension of the existing urban area and is considered to be comparable with other recently developed (and under construction) residential schemes in the locality. Given this context, beyond good residential development design, it is not considered that there are any notable design changes that would moderate effects further.
All mitigation relating to the layout and architectural character of the proposals have been embedded within the proposals as part of an iterative and consultative design approach, ensuring that careful consideration has been given to the receiving landscape. In this regard, the 'residual' effects will be no different to those described in the main body of the assessment.

Construction Phase

It is not considered that there are any additional mitigation measures required to reduce the anticipated construction phase landscape / visual effects over those that would be considered standard best practice construction management measures. It is anticipated that this may include aspects such as the timing of construction activities, which will be restricted in accordance with local authority guidance, and will likely be consistent with those enforced on nearby sites. Effects during construction are an inevitable consequence of the development and are likely to be consistent with those enforced on nearby sites.

Operational Phase

Landscape and urban design measures are integral to the development proposals being assessed and will help to assimilate built form within its surrounding context in a general sense whilst contributing to the character and quality of the development.

Particular consideration has been made to the sloping nature of the site, with the development typology responding to more elevated parts of the site. The layout of the development has also sought to work with the framework of existing vegetation as far as practicable, augmenting this with additional planting. Whilst new planting is important to the character of the development, and will enhance the quality of the effects, it is not a case that its establishment will result in materially different impact judgements before and after landscape planting becomes established.

In this regard, other than those features and characteristics of the development proposals that have been embedded into the design of the scheme, there are no additional landscape and visual mitigation measures considered necessary in this instance.

Monitoring

Landscape tender drawings and specifications will be produced to ensure that the landscape work is implemented in accordance with best practice. This document will include tree work procedures, soil handling, planting and maintenance. All landscape and planting works will be undertaken as soon as practicable in the planting season after completion of key civil engineering and building works, and supervised by a suitably qualified Landscape Architect Clerk of Works.

All landscape works will be subject to an establishment phase following planting, with replacement plant material and required pruning measures captured in Landscape Management Plans (LMPs). LMPs are intrinsically linked to the successful establishment of landscape and visual mitigation measures.

Prior to the completion of the landscape works, a competent landscape contractor will be engaged and a detailed maintenance plan, scope of operation and methodology will be put in place to ensure the successful long-term establishment of all external landscape areas.

Management and maintenance operations are inherently related to the continued appearance of the development and the establishment of planting and will include general management and maintenance measures (mowing, litter picking etc.), as well as measures such as weed control, replacement planting, formative pruning etc.
Whilst plant failures can be an unfortunate reality on development sites, many of these can be readily attributed to site, plant material, or contractor issues, and can be readily corrected. Holistic and widespread failure of plant material and other external landscape works is unlikely and is not in the commercial interests of developers and contractors.

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