

18 Cumulative Effects, Other Effects and Interactions

18.1 Introduction

This chapter presents:

- an assessment of the likely effects of the proposed development on the environment resulting from the cumulation of effects with other existing and/or approved projects, and
- an assessment of the interaction/inter-relationship of effects between environmental factors.

The methodology used to assess interaction/inter-relationship and cumulative effects is presented in **Section 18.2**. Cumulative effects are discussed in **Section 18.3** whilst the interaction between environmental factors are discussed in **Section 18.4**. Potential transboundary effects are also discussed in **Section 18.5**. The Do-Nothing scenario is briefly discussed in **Section 18.6** for the individual assessment topics of **Chapters 6-17** of this EIAR). This chapter concludes with references (**Section 18.6**).

18.2 Assessment Methodology

18.2.1 Guidance

This chapter has been prepared in accordance with the following guidance:

- Department of Housing, Planning and Local Government (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, August 2018.
- EPA (2017) Guidelines on the Information to be contained in Environmental Impact Assessment Reports, Draft, August 2017.
- European Commission (2017) Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report. (Office for Official Publications of the European Communities 2017).
- EPA (2015) Revised Guidelines on the Information to be contained in Environmental Impact Statements, Draft, 2015.
- EPA (2015) Advice Notes on Current Practice in the Preparation of Environmental Impact Statements, Draft, 2015.
- EPA (2003) Advice Notes on Current Practice in the Preparation of Environmental Impact Statements, 2003.
- EPA (2002) Guidelines on the Information to be contained in Environmental Impact Statements, 2002.

- European Commission (1999) Guidelines for the Assessment of Indirect and Cumulative Effects as well as Impact Interactions, (Office for Official Publications of the European Communities 1999).

18.2.2 Definitions

The following definitions are generally used in the description of cumulative effects or interaction of effects.

It is noted that the terms “*effects*” and “*impacts*” are used interchangeably in this chapter.

The EC guidance (2017) uses the following definition for cumulative effects are defined as:

“Changes to the environment that are caused by activities/projects in combination with other activities/projects”.

EC guidance (2017) also states that:

“It is important to consider effects not in isolation, but together, that is cumulatively. [...] Cumulative effects are changes to the environment that are caused by an action in combination with other actions. They can arise from:

- *The interaction between all of the different projects in the same area;*
- *The interaction between various impacts within a single Project (while not expressly required by the EIA Directive this has been clarified by the CJEU [Court of Justice of the European Union] [...]).”*

Under the EPA draft guidance (2017) cumulative effects are defined as:

“The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects”.

The EC guidelines (1999) use slightly different definitions as follows:

“Cumulative Impacts: Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project”.

The EC guidelines (1999) use definitions as follows:

“Impact Interactions: The reactions between impacts whether between the impacts of just one project or between the impacts of other projects in the area”.

The term ‘*impact interactions*’ is equivalent to the term ‘*inter-relationship of effects*’. The EC guidelines (1999) accept that their definitions overlap to a certain extent. The EC guidelines also refer to ‘*Cross-Media Impacts*’, in which the impact in one environmental medium may also have an indirect impact on another medium.

18.2.3 Cumulative Effects Assessment Methodology

Annex IV (5)(e) of the EIA Directive as amended by Directive 2014/52/EU requires that the EIAR shall contain:

“A description of the likely significant effects of the project on the environment resulting from, inter alia:

*(e) the **cumulation of effects** with other **existing and/or approved projects**, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources; Furthermore, Annex IV (5) states that the EIAR shall contain:*

*“The description of the likely significant effects on the factors specified in Article 3(1) should cover the direct effects and any indirect, secondary, **cumulative**, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the project. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project”.*

At the initial stage of preparing the EIAR for the proposed development, the potential for significant cumulative impacts were examined and any potential effects were identified. These potential effects were included in the scope and addressed in the baseline and impact assessment studies for each of the relevant environmental factors.

Likely significant cumulative effects of the proposed development in-combination with other existing and/or approved projects for each of the environmental factors were initially identified, considered and assessed in respective chapters of the EIAR.

Section 18.3 of this chapter presents a summary of all of the individual assessments together and examines and assesses whether the proposed development in combination with those other existing/approved projects would be likely to have significant effects (direct and indirect) both on an individual basis with the proposed development and also cumulatively with all such projects. No additional mitigation measures are proposed in this chapter. The process for identifying “other existing and/or approved projects” is described in **Section 18.3.1** below.

18.2.4 Interactive Effects Assessment Methodology

Article 3 (1) of the EIA Directive as amended by Directive 2014/52/EU requires that:

*“The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors: (a) population and human health; (b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC; (c) land, soil, water, air and climate; (d) material assets, cultural heritage and the landscape; (e) **the interaction between the factors referred to in points (a) to (d)**”.*

The consideration of interactive effects was an integrated process which commenced at the very outset of the project. At the initial stage of preparing the EIAR for the proposed development, the potential for significant interactions between environmental factors were examined and any potential effects were identified. These potential effects were included in the scope and addressed in the baseline and impact assessment studies for each of the relevant environmental factors. There were numerous discussions and communications between the environmental specialists and the design team throughout the design process which helped to identify and minimise the potential for significant interactions of effects arising in the first instance.

The interaction of effects within the proposed development in respect of each of the environmental factors, listed in Article 3(1) of the EIA Directive, have been identified and addressed in detail in the respective chapters in this EIAR. Thus, no additional mitigation is proposed in this chapter.

Section 18.4 of this chapter presents a summary of each assessment of the interaction (inter-relationship) of effects (from the proposed development) between the various environmental factors. Mitigation measures relative to those interactions are addressed in individual chapters.

The matrix and expert opinion approaches, as outlined in the EC Guidelines (2017), were used in the identification of the potential for significant interactions of effects. Refer to **Table 18.4** for the matrix of potential interactions.

18.2.5 Transboundary Effects Assessment Methodology

This EIAR has considered and assessed the potential for transboundary effects arising from the construction and operation of the proposed development. Certain environmental effects of a proposed development have the potential to cross state boundaries, for example, air or water emissions, and have a ‘transboundary effect’. Under the EIA Directive (2014/52/EU) the likely significant transboundary effects of a proposed development must be described. Annex IV (5)(e) of the EIA Directive as amended by Directive 2014/52/EU states:

*“The description of the likely significant effects on the factors specified in Article 3(1) should cover the direct effects and any indirect, secondary, cumulative, **transboundary**, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the project. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project.”*

Section 18.5 of this chapter considers the transboundary effects of the proposed development. All activities associated with the construction and operation of the proposed development were assessed for the likely significant transboundary effects.

18.3 Cumulative Effects

This section presents an assessment of the likely effects of the proposed development on the environment resulting from the cumulation of effects with other existing and/or approved projects. The first stage was to identify the “other existing and/or approved projects to be included in the assessment. This process is described in **Section 18.3.1** below. The projects that were included in the assessment are presented in **Table 18.1** below.

Likely significant cumulative effects of the proposed development in-combination with those projects listed in **Table 18.1** for each of the environmental factors were initially identified, considered and assessed in respective chapters (6-17) of the EIAR. All of the experts have reviewed the available materials relating to the existing/approved projects in **Table 18.1** below in order to conduct their assessments.

Table 18.2 presents the results of the likely significant direct, indirect and cumulative effect assessment (under all of the individual environmental factors) for each project listed in **Table 18.1** individually, in-combination with the proposed development. **Table 18.3** presents the results of the likely significant direct, indirect and cumulative effects assessment of each project listed in **Table 18.1** all together as a whole in combination with the proposed development.

The conclusion of the assessment presented in this chapter is that there are no likely significant cumulative effects (direct and indirect) arising from an assessment of the projects listed in **Table 18.1** as explained in the tables below. No additional mitigation measures are necessary or required following this assessment.

18.3.1 Identification of “other existing and/or approved projects”

A review was initially carried out to identify other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular importance likely to be affected or the use of natural resources. A review was carried out of the planning files for:

- Meath County Council (MCC);
- Neighbouring County Councils (such as Louth County Council);
- An Bord Pleanála (ABP); and
- Department of Housing, Planning and Local Government (DHPLG) EIA Portal.

Arising from this review, a number of existing and/or approved projects (as listed in **Table 18.1** below) were identified which could have the potential for likely significant cumulative effects.

The assessment in this chapter considers and assesses whether any of these existing/approved projects will likely have significant cumulative effects in combination with the proposed Site Sustainability project.

The assessment also considers whether all of the existing/approved projects taken together as a whole will likely have significant cumulative effects in combination with the proposed Site Sustainability Project.

There are many projects listed on the planning database for Meath County Council, neighbouring county councils, An Bord Pleanála and the DHPLG EIA Portal. However, the focus for this assessment was on the proximity, scale and nature of those projects in relation to the proposed Site Sustainability Project and on those which could potentially exacerbate environmental effects and thus be of significance to the cumulative effects assessment.

For example, particular attention was given to those projects which were designated as Strategic Infrastructure Developments (SID) or Strategic Housing Development (SHD) in proximity to the proposed development given the larger scale and nature of these developments. Those projects where EIARs or NIS's accompanied the planning applications were also given due regard at review stage.

Live or proposed projects which have not yet been permitted were not considered in this assessment. Further, there are other applications which have been refused planning consent or have been withdrawn or invalidated and these have also not been considered or assessed in this cumulative effects assessment.

It is noted that the SID electricity application for SSE Generation Ireland (ABP Ref. PL17. 303678) (110kV substation) was approved and is therefore included in this assessment. Refer to **Table 18.1** below. However, this project relates to a larger “parent project application”; an open cycle gas turbine power plant planning application (Meath Planning Ref. LB190031) which has since been refused. It is not known whether or not the approved SID electricity application may be constructed if the parent project is not developed in the future.

Table 18.1 List of planned projects identified as having potential cumulative effects due to the construction and/or operation of the proposed development.

Applicant	Planning Ref.	Description	Status	Source
Irish Cement Ltd.	LB150375	The development will consist of the installation of a Flue Dust Portland Cement Silo at Kiln 3. The development will include the provision of a silo of circa 40m in height and 12m in diameter, together with filter, access gantries, bucket elevator and truck loading facility all on an application site of circa 0.75 hectares located within Platin Cement Works. This application relates to an activity for which an Industrial Emissions Licence applies under the Environmental Protection Acts 1992 as amended. (IE Licence Register Number P0030).	Planning permission granted June 2015. Construction status unknown	MCC
Irish Cement Ltd.	PL17 .PA0050	10-year permission to facilitate further replacement of fossil fuels and allow for the introduction of alternative raw materials in the manufacturing of cement at Platin Cement Works, Platin, Co. Meath. The proposed development is for the use of an additional 480,000 tonnes per annum of alternative fuels and alternative raw materials. SID application. Irish Cement is at licence review stage to facilitate the planned activity at the plant under Licence No. P0030-66. In February 2020, the EPA issued a Proposed Determination to grant a revised licence. The window for submitting objections to the EPA has passed (18 March 2020). The EPA is currently considering submissions.	Planning permission granted April 2018. Construction status unknown	ABP, EPA
SSE Generation Ireland Ltd	PL17. 303678	Application to ABP (Electricity Development Application) for the Air insulated switchgear 110kV transmission substation. http://www.pleanala.ie/casenum/303678.htm It is noted that the substation scheme above appears to be an enabling component for a separate planning application for an open cycle gas turbine (OCGT) power plant, which was submitted to Meath County Council and permission granted in July 2019, but was subsequently appealed to An Bord Pleanála, where it	Planning permission granted January 2020. Construction status unknown.	MCC & ABP

Applicant	Planning Ref.	Description	Status	Source
		was ultimately refused in December 2019. The OCGT plant therefore does not have a grant of planning and has not been included in this assessment.		
Highfield Solar Ltd.	PL17.248146	<p>Garballagh Lower Solar Farm</p> <p>Applicant applied to Meath CC for solar farm on 2 sites (Site 1 and Site 2) and a 110kV substation. Meath CC granted permission (conditional) under Ref. LB160898 on 10/02/17.</p> <p>Decision appealed to ABP (Ref. PL17.248146). ABP granted the solar farm on Site 1 only and ordered that planning for 110kV substation be applied under SID (see Ref. PL17.303568 below)</p> <p>http://www.pleanala.ie/casenum/248146.htm</p>	<p>Planning permission granted March 2019.</p> <p>Construction status unknown.</p>	MCC & ABP
Highfield Solar Ltd	PL17.303568	<p>Garballagh Lower Solar Farm</p> <p>Related to project above (ABP Ref. PL17.248146). Proposed electrical substation and associated 110kV and MV infrastructure required to connect ground mounted solar PV generation to the electrical transmission system, underground cabling and all associated ancillary site development work. SID application.</p> <p>http://www.pleanala.ie/casenum/303568.htm</p>	<p>Planning permission granted July 2019.</p> <p>Construction status unknown.</p>	ABP

18.3.2 Overall Cumulative Effects Assessment

Table 18.2 Likely significant direct, indirect and cumulative effects¹ assessment of approved projects listed in Table 18.1 in combination with the proposed development.

Plan/Project Ref No	Potential Cumulative Effects on Environmental Factors	Overall Cumulative Impact (if any)
<p>Irish Cement Limited</p> <p>LB150375</p> <p>Flue Dust Portland Cement Silo</p>	<p>Population and Human Health: Should the construction of the planned cement silo at Irish Cement and the proposed development occur concurrently, there is potential for temporary indirect cumulative effects on population and human health due to increased construction traffic and nuisances associated with site activities (dust, noise). However, given the scale of the of the planned development it is unlikely there will be a significant direct or indirect cumulative effect on population during construction. No significant direct or indirect cumulative effects on population or human health are predicted during the operation of the planned and proposed development.</p> <p>As this planned development will not result in any additional emissions to atmosphere during operation the cumulative effects on human health are deemed imperceptible.</p> <p>Traffic and Transport: The current timeline for construction is unknown. No detail relating to anticipated traffic movements was available for this project; however, it is stated in the planning report on file that <i>‘The planning authority would anticipate that during construction works the proposed development will have an imperceptible to slight impact on traffic but at operational stage there will be no impact’</i>.</p> <p>Therefore, it is anticipated (based on the information above) that there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p> <p>Therefore, no further allowance has been made for this scheme within the Traffic and Transportation chapter.</p> <p>Air Quality: There is the potential for cumulative dust emissions during construction. However, it is predicted that this development will not result in any additional emissions to atmosphere during operation. The planners report submitted as part of the application details that <i>“projected pollutant emissions are insignificant”</i>. Therefore, cumulative impacts are deemed imperceptible and there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p>	<p>None</p>

¹It is noted that the terms “effects” and “impacts” are used interchangeably in this chapter and assessment.

Plan/Project Ref No	Potential Cumulative Effects on Environmental Factors	Overall Cumulative Impact (if any)
	<p>Climate: There are no climate related impacts predicted as part of this development and therefore there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p> <p>Noise and Vibration: The proposal has a negligible noise impact on the surrounding noise environment. In addition, any amendments to on-site operations within the Platin cement works IE licence are required to operate within the relevant noise emission limit values. Therefore, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p> <p>Biodiversity: The development will consist of the installation of a Flue Dust Portland Cement Silo. This application relates to an activity for which an Industrial Emissions Licence applies under the Environmental Protection Acts 1992 as amended. (IE Licence Register Number P0030). In the absence of significant emissions to air or water no significant cumulative impact on biodiversity has been identified. Therefore, there is no potential for significant negative direct nor indirect cumulative effects on biodiversity.</p> <p>Archaeology, Architecture and Cultural Heritage: The majority of the proposed development at Indaver lies within the footprint of ground which has already been archaeologically resolved and is predominantly brownfield. The overall impact of ground works on the small remaining areas of unstripped ground has been assessed as slight. When the predicted impact of the proposed development at Indaver is combined with the development by Irish Cement Limited, no significant negative direct nor indirect cumulative effects are predicted on the overall archaeological landscape.</p> <p>Landscape and Visual: Due to the scale, nature and separate location of the development and given that the assessed impacts of the proposed development are imperceptible/not significant, this development does not have any potential to alter the significance of effects associated with the proposed development. Any cumulative effect will be imperceptible/not significant. Thus, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p> <p>Land and Soils: The Planner's Report² (2015), prepared by Meath County Council, states that '[...] <i>no soils, geology or habitats will be affected</i>' and '<i>the proposed development will not result in any additional water discharges</i>'. Therefore, there is no potential for significant negative direct not indirect cumulative impacts on land, soils and hydrogeology.</p>	

² Available for inspection from Meath County Council Planning database, <http://www.eplanning.ie/MeathCC/AppFileRefDetails/LB150375/0>

Plan/Project Ref No	Potential Cumulative Effects on Environmental Factors	Overall Cumulative Impact (if any)
	<p>Water: Irish Cement operate under and EPA IE Licence P0030-05. According to Section 7.3.2.1 of the EIAR³ (2017), the average volume of water discharged to the River Nanny in 2016 from the Irish Cement site was 14,720m³/day. The Planner's Report⁴ (2015), prepared by Meath County Council, states that '<i>the proposed development will not result in any additional water discharges</i>'. Given the likely effects of the proposed Indaver development on hydrology and that there will be no change in surface water emissions as a result of this planned development at Irish Cement (Planning Ref. LB150375), it is concluded that there is no potential for significant negative direct or indirect cumulative effects on hydrology and water quality as a result of the proposed Indaver development and the planned development (Ref. LB150375).</p> <p>Material Assets: The development will include the provision of a silo of circa 40m in height and 12m in diameter, together with filter, access gantries, bucket elevator and truck loading facility all on an application site of circa 0.75 hectares located within Platin Cement Works. Permission was granted in June 2015. The current timeline for construction is unknown. There is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p> <p>Major Accidents and Disasters: The distance between the closest buildings at Indaver and at Irish Cement is more than 400 m. The new developments at Irish Cement would therefore be well outside the hazard distances calculated for any of the scenarios identified in the HAZID. There is no risk to either of the planned developments at Irish Cement arising from the activities or the planned activities at Indaver. In conclusion, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from major accidents or disasters associated with the Indaver Site Sustainability Project in combination with this Irish Cement project above.</p>	
<p>Irish Cement Limited</p> <p>PL17 .PA0050</p>	<p>Population and Human Health: Should the construction of the planned development at Irish Cement and the proposed development occur concurrently, there is potential for temporary indirect effects on population due to increased construction traffic and nuisances associated with site activities (dust, noise). However, given the location of the of the planned development in relation to the Indaver site, it is unlikely there will be a significant cumulative indirect effect on population during construction. No significant direct or indirect cumulative effects are predicted during the operation of the planned and proposed developments.</p>	None

³ Available for inspection under EPA IE Licence application P0030-06, <https://www.epa.ie/licensing/>

⁴ Available for inspection from Meath County Council Planning database, <http://www.eplanning.ie/MeathCC/AppFileRefDetails/LB150375/0>

Plan/Project Ref No	Potential Cumulative Effects on Environmental Factors	Overall Cumulative Impact (if any)
<p>Alternative fuels and raw materials.</p>	<p>Traffic and Transport: The planned development is for the use of an additional 480,000 tonnes per annum of alternative fuels and alternative raw materials. Permission was granted in April 2018. The current timeline for construction is unknown. Nevertheless, the traffic flows associated with this scheme have been obtained from the planning documentation and have been included within this chapter for assessment purposes (it is noted that the majority of estimated construction and operational traffic flow associated with this development is assumed in the relevant planning documentation to be via the M1 and R152 to the north of the proposed development site). Thus, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p>	
	<p>Air Quality: There is the potential for cumulative construction stage dust emissions, however, in the EIA Report prepared by Brady Shipman Martin (2017), Section 8.4.1 states that dust soiling effects are predicted within 25m of the works area and PM₁₀ effects within 10m. As there are no sensitive receptors within this area and there is sufficient distance between the works areas and the Site Sustainability Project area and cumulative dust impacts are not predicted. Section 8.44 of the EIA Report (Brady Shipman Martin, 2017) determined that cumulative operational phase emissions from both the Platin site and the Indaver site were insignificant. Therefore, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p>	
	<p>Climate: This development is predicted to have a positive impact on climate due to the CO₂ savings through the use of alternative fuels relative to fossil fuels. As outlined in the EIA Report (Brady Shipman Martin, 2017) it is estimated that a saving of approximately 314,340 tonnes CO₂ per annum will be achieved as a result of the project. Cumulative impacts are considered neutral. Impacts to climate are not predicted during the construction phase of this development. Therefore, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p>	
	<p>Noise and Vibration: The proposal has a negligible noise impact on the surrounding noise environment. In addition, any amendments to on-site operations within the Platin cement works IE Licence are required to operate within the relevant noise emission limit values. Therefore, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p>	

Plan/Project Ref No	Potential Cumulative Effects on Environmental Factors	Overall Cumulative Impact (if any)
	<p>Biodiversity: In the absence of significant emissions to air or water no significant cumulative impact on biodiversity has been identified. Therefore, there is no potential for significant negative direct nor indirect cumulative effects on biodiversity as a result of the proposed and planned development.</p> <p>Archaeology, Architecture and Cultural Heritage: The majority of the proposed development at Indaver lies within the footprint of ground which has already been archaeologically resolved and is predominantly brownfield. The overall impact of ground works on the small remaining areas of unstripped ground has been assessed as slight. When the predicted impact of the proposed development at Indaver is combined with the development by Irish Cement limited, no significant negative direct nor indirect cumulative effects are predicted on the overall archaeological landscape.</p> <p>Landscape and Visual: Due to the scale, nature and separate location of the development and given that the assessed impacts of the proposed development are imperceptible/not significant, this development does not have any potential to alter the significance of effects associated with the proposed development. Any cumulative effect will be imperceptible/not significant. Thus, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p> <p>Land and Soils: Based on the EIA Report⁵ (2017), Section 6.5 states that there is no potential for cumulative impact on land, soils and hydrogeology. The report states ‘<i>The proposed works will have no impact on the dewatering operations within the quarry</i>’. Therefore, there is no potential for significant negative direct not indirect cumulative impacts on land, soils and hydrogeology as a result of the proposed and planned development.</p> <p>Water: The nature of proposed works at Irish Cement under PL17.PA0050 are regarding the increase in volume of alternative fuels accepted by the facility and as stated in Section 7.4.4 of the EIA Report³ (2017), there will be no significant change in the nature or quantity of runoff to surface waters as a result of the planned development (ABP Ref. PL17.PA0050) at Irish Cement. Given the likely effects of the proposed Indaver development on water and that there will be no change in surface water emissions as a result of this planned development at Irish Cement (ABP Ref. PL17.PA0050), it is concluded that there is no potential for significant negative direct or indirect cumulative effects on hydrology and water quality as a result of the proposed development and the planned development (ABP Ref PL17.PA0050).</p>	

⁵ Available for inspection under EPA IE Licence application P0030-06, <https://www.epa.ie/licensing/>

Plan/Project Ref No	Potential Cumulative Effects on Environmental Factors	Overall Cumulative Impact (if any)
	<p>Material Assets: This planning application was for a 10-year permission to facilitate further replacement of fossil fuels and allow for the introduction of alternative raw materials in the manufacturing of cement at Platin Cement Works, Platin, Co. Meath. The proposed development is for the use of an additional 480,000 tonnes per annum of alternative fuels and alternative raw materials. Permission was granted in April 2018. The current timeline for construction is unknown.</p> <p>There is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p> <p>Major Accidents and Disasters: The distance between the closest buildings at Indaver and at Irish Cement is more than 400 m. The new developments at Irish Cement would therefore be well outside the hazard distances calculated for any of the scenarios identified in the HAZID. There is no risk to either of the planned developments at Irish Cement arising from the activities or the planned activities at Indaver. In conclusion, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from major accidents or disasters associated with the Indaver Site Sustainability Project in combination with the project above.</p>	
<p>SSE Generation Ireland Ltd.</p> <p>PL17.303678</p> <p>110kV transmission substation</p>	<p>Population and Human Health: Should the construction of the planned substation and the proposed development occur concurrently, there is potential for temporary indirect effects on population due to increased construction traffic and nuisances associated with site activities (dust, noise). However, given the scale of the of the planned development, it is unlikely there will be significant indirect cumulative effects on population during construction. No significant direct or indirect cumulative effects are predicted during the operation of the planned and proposed developments.</p> <p>Traffic and Transport: Given the grant of permission received by the 110kV substation there is potential for this scheme to proceed as a standalone project.</p> <p>Within the associated Environmental Report for the proposed developments (both schemes are presented as one single ‘project’), the construction stage is expected to be 18 months duration. No distinction is provided within the report between the open cycle gas turbine (OCGT) construction traffic and the substation construction traffic. Furthermore, the report outlines that the proposed development will require a new priority junction to be constructed on the R152, to the north of the Indaver site, and it is also stated that construction HGV traffic will only access the site from the north (via the M1).</p> <p>On this basis, with construction likely to be complete before 2022 and construction traffic only permitted to route to and from the M1, no further allowance has been made within the Traffic and Transportation chapter for the proposed substation element of the scheme.</p>	<p>None</p>

Plan/Project Ref No	Potential Cumulative Effects on Environmental Factors	Overall Cumulative Impact (if any)
	<p>Thus, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p> <p>Air Quality: There is the potential for cumulative construction dust related impacts as a result of the substation development if the construction phase overlaps with the construction of the Site Suitability Project. However, due to the small scale of the development there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p> <p>Climate: Significant impacts to climate are not predicted as a result of the substation development as there are no direct emissions to atmosphere during operation. Construction vehicles and machinery may give rise to some GHG emissions during construction, however, due to the small scale of the development and the predicted low volume of machinery required GHG emissions are considered imperceptible. The cumulative impact to climate is overall imperceptible and therefore there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p> <p>Noise and Vibration: The environmental report for this development concludes there are no potential significant noise sources identified with respect to the substation, and therefore no operational noise impacts are predicted. On the basis of the assessment presented, the cumulative impact of this development coupled with the proposed development under consideration here is therefore negligible. Therefore, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p> <p>Biodiversity: Section 6.4.1 of the EIAR⁶ (2019) prepared for the SID application stated that ‘<i>There will be no discharges to ground or groundwater during the operational phase of the Substation as none of the substation infrastructure will pose a risk to land and soils during the operational phase.</i>’ Therefore, there is no potential for significant negative direct nor indirect cumulative effects on biodiversity as a result of the proposed and planned development.</p> <p>Archaeology, Architecture and Cultural Heritage: The majority of the proposed development lies within the footprint of ground which has already been archaeologically resolved and is predominantly brownfield. The impact of ground works on the small remaining areas of unstripped ground has been assessed as slight. When the predicted impact of the proposed development at Indaver</p>	

⁶ Available from: <http://caulstown-platin-substation.com/downloads/environmental/substation-environmental-report.pdf>

Plan/Project Ref No	Potential Cumulative Effects on Environmental Factors	Overall Cumulative Impact (if any)
	<p>is combined with the development by SSE Generation Ireland Ltd, no significant negative direct nor indirect cumulative effects are predicted on the overall archaeological landscape.</p> <p>Landscape and Visual: Due to the scale, nature and separate location of the development and given that the assessed impacts of the proposed development are imperceptible/not significant, this development does not have any potential to alter the significance of effects associated with the proposed development. Any cumulative effect will be imperceptible/not significant.</p> <p>Therefore, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p> <p>Land and Soils: Section 6.4.1 of the EIAR⁷ (2019) prepared for the SID application stated that <i>‘There will be no discharges to ground or groundwater during the operational phase of the Substation as none of the substation infrastructure will pose a risk to land and soils during the operational phase.’</i> As such, there is no potential for significant negative direct nor indirect cumulative impacts on land, soils and hydrogeology as a result of the proposed and planned development (Ref. PL17.303678).</p> <p>Water: Chapter 9 (Water and Wastewater), of the Substation Environmental Report (ER)⁸ (2019) prepared for the planning application (Ref. PL17.303678) states that surface water runoff will be discharged to the River Nanny via drainage ditches east of the site. The report states that <i>‘There will be no change to the water volume discharged to the drainage ditch, with the volume of rainwater currently falling on site and being received by the existing drainage system, remaining the same.’</i> A number of mitigation measures were proposed in the ER to <i>‘prevent any accidental contamination of surface water (rainfall) runoff from the site and prevent/contain any accidental discharges of hazardous substances’.</i></p> <p>Given the nature of the planned works (transmission station), it is concluded that there is no potential for significant negative direct or indirect cumulative effects on hydrology and water quality as a result of the proposed development and the planned development (ABP Ref. PL17.303678).</p> <p>Material Assets: It is noted that the substation scheme above appears to be an enabling component for a separate planning application for an open cycle gas turbine (OCGT) power plant, which was submitted to Meath County Council and permission granted in July</p>	

⁷ Available from: <http://caulstown-platin-substation.com/downloads/environmental/substation-environmental-report.pdf>

⁸ Substation Environmental Report (2019) available from: <http://caulstown-platin-substation.com/downloads/environmental/substation-environmental-report.pdf>

Plan/Project Ref No	Potential Cumulative Effects on Environmental Factors	Overall Cumulative Impact (if any)
	<p>2019, but was subsequently appealed to An Bord Pleanála, where it was ultimately refused in December 2019. The OCGT plant therefore does not have a grant of planning.</p> <p>Given the grant of permission received by the 110kV substation there is potential for this scheme to proceed as a standalone project. There is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above with regard to material assets.</p> <p>Major Accidents and Disasters: The proposed site for development of this facility is located to the south of the R152. As noted previously, there are no significant impacts at this road from the major accident scenarios. This in turn also means that there are no significant impacts at the site of the SSE project, which is located across the road from the Indaver site.</p> <p>In conclusion, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from major accidents or disasters associated with the Indaver Site Sustainability Project in combination with the project above.</p>	
<p>Highfield Solar Ltd.</p> <p>PL17.248146</p> <p>Solar farm</p>	<p>Population and Human Health: Should the construction of the planned substation and the proposed development occur concurrently, there is potential for temporary indirect cumulative effects on population due to increased construction traffic and nuisances associated with site activities (dust, noise). However, cumulative noise or air quality impacts associated with the construction of the proposed development and the planned solar farm development are not envisaged due to the low volume of construction required and the use of materials with a low dust generation potential planned for the solar farm. In addition, given the location of the of the planned development in relation to Indaver, it is unlikely there will be significant indirect cumulative effects on population during construction. There are no emissions to atmosphere associated with the operational stage of this development. Therefore, no direct or indirect cumulative human health impacts are predicted.</p> <p>Traffic and Transport: This application relates to a scheme titled ‘Garballagh Lower Solar Farm’ for the development of a Solar Farm. This application was granted by An Bord Pleanála in March 2019. Construction is underway; however, the estimated opening date is unknown.</p> <p>It is assumed that this scheme will be constructed before construction commences for the Site Sustainability Project. Operationally, the solar farm will have a negligible impact. Thus, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p>	<p>None</p>

Plan/Project Ref No	Potential Cumulative Effects on Environmental Factors	Overall Cumulative Impact (if any)
	<p>Air Quality: Cumulative air quality impacts associated with the solar farm development are not envisaged due to the low volume of construction required and the use of materials with a low dust generation potential. There are no emissions to atmosphere associated with the operational stage of this development.</p> <p>Thus, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p> <p>Climate: The solar farm development will have a positive impact on climate by reducing the reliance on fossil fuels and increasing the capacity of renewable energy available on the national grid. Cumulative impacts are considered neutral and therefore there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p> <p>Noise and Vibration: This development is over 4km from the Caranstown Indaver WtE facility and will not result in any cumulative noise impact to the surrounding environment. Therefore, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p> <p>Biodiversity: Applicant applied to Meath County Council (CC) for solar farm on 2 sites (Site 1 and Site 2) and a 110kV substation. Meath CC granted permission (conditional). In the absence of significant emissions to air or water no significant cumulative impact on biodiversity has been identified. Therefore, there is no potential for significant negative direct nor indirect cumulative effects on biodiversity as a result of the proposed and planned development</p> <p>Archaeology, Architecture and Cultural Heritage: The majority of the proposed development lies within the footprint of ground which has already been archaeologically resolved and is predominantly brownfield. The impact of ground works on the small remaining areas of unstripped ground has been assessed as slight. When the predicted impact of the proposed development at Indaver is combined with the development by Highfield Solar Ltd., no significant negative direct nor indirect cumulative effects are predicted on the overall archaeological landscape.</p> <p>Landscape and Visual: This development is over 4km from the Caranstown WtE facility and will not result in any cumulative noise impact to the surrounding environment. Due to the scale, nature and distant location of the development and given that the assessed impacts of the proposed development are imperceptible/not significant, this development does not have any potential to alter the significance of effects associated with the proposed development. Any cumulative effect will be imperceptible/not significant.</p>	

Plan/Project Ref No	Potential Cumulative Effects on Environmental Factors	Overall Cumulative Impact (if any)
	<p>Thus, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p> <p>Land and Soils: Section 7.8.4 of the Inspector’s Report⁹ (2017) reported that ‘[...] <i>the construction process outlined for the solar farm to be relatively low impact from a geotechnical perspective, with significant earthworks only occurring for the access tracks, substations and cable routes</i>’.</p> <p>As such, there is no potential for significant negative direct not indirect cumulative impacts on land, soils and hydrogeology as a result of the proposed and planned development.</p> <p>Water: Given the nature and scale of the planned works (solar farm), surface water emissions will not be significant. The Inspector’s Report¹⁰ (2017), in Section 7.8.10 the Inspector stated, ‘<i>I am satisfied that the proposed development would not negatively impact on current drainage patterns or be at significant risk of fluvial flooding</i>’. Therefore, it is concluded that there is no potential for significant negative direct or indirect cumulative effects on hydrology and water quality as a result of the proposed development and the planned development (ABP Ref. PL17.248146).</p> <p>Material Assets: It is reasonable to assume that this scheme will be constructed before construction commences for the Site Sustainability Project. In relation to material assets, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p> <p>Major Accidents and Disasters: The new development at Highfield Solar is at a much further distance from Indaver than the developments at Irish Cement. There is no risk to the planned development at Highfield Solar arising from the activities or the planned activities at Indaver. In conclusion, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from major accidents or disasters associated with the Indaver Site Sustainability Project in combination with the project above.</p>	
Highfield Solar Ltd.	Population and Human Health: Should the construction of the planned substation and the proposed development occur concurrently, there is potential for temporary indirect effects on population due to increased construction traffic and nuisances associated with site activities (dust, noise). However, given the location of the of the planned development, it is unlikely there will be significant indirect	

⁹ Available for inspection from An Bord Pleanála: <http://www.pleanala.ie/casenum/248146.htm>

¹⁰ Available from An Bord Pleanála, <http://www.pleanala.ie/documents/reports/248/R248146.pdf>

Plan/Project Ref No	Potential Cumulative Effects on Environmental Factors	Overall Cumulative Impact (if any)
<p>PL17 .303568</p> <p>Electrical substation (110kV)</p>	<p>cumulative effects on population during construction. No significant direct or indirect cumulative effects on population or human health are predicted during the operation of the planned and proposed developments as there will be no emissions from the substation</p>	<p>None</p>
	<p>Traffic and Transport: Construction is underway however, the estimated opening date is unknown. It is assumed that this scheme will be constructed before construction commences for the Site Sustainability Project. Operationally, this development will have a negligible impact. Thus, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p>	
	<p>Air Quality: Cumulative air quality impacts associated with the electrical substation development are not envisaged due to the low volume of construction required. There are no emissions to atmosphere associated with the operational stage of this development. Thus, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p>	
	<p>Climate: The electrical substation development will allow for the renewable electricity generated by the solar farm development to be transported to the national grid. This will have a positive impact on climate by reducing the reliance on fossil fuels and increasing the capacity of renewable energy available on the national grid. Cumulative impacts are considered neutral and therefore there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p>	
	<p>Noise and Vibration: This development is over 4km from the Caranstown WtE facility and will not result in any cumulative noise impact to the surrounding environment. Therefore, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.</p>	
	<p>Biodiversity: Proposed electrical substation and associated 110kV and MV infrastructure required to connect ground mounted solar PV generation to the electrical transmission system, underground cabling and all associated ancillary site development work. SID application. In the absence of significant emissions to air or water no significant cumulative impact on ecology has been identified. Therefore, there is no potential for significant negative direct nor indirect cumulative effects on biodiversity as a result of the proposed and planned development</p>	
	<p>Archaeology, Architecture and Cultural Heritage: The majority of the proposed development lies within the footprint of ground which has already been archaeologically resolved and is predominantly brownfield. The impact of ground works on the small remaining areas of unstripped ground has been assessed as slight. When the predicted impact of the proposed development at Indaver</p>	

Plan/Project Ref No	Potential Cumulative Effects on Environmental Factors	Overall Cumulative Impact (if any)
	<p>is combined with the development by Highfield Solar Ltd., no significant cumulative negative direct nor indirect effects are predicted on the overall archaeological landscape.</p> <p>Landscape and Visual: This development is over 4km from the Caranstown WtE facility and will not result in any cumulative noise impact to the surrounding environment. Due to the scale, nature and distant location of the development and given that the assessed impacts of the proposed development are imperceptible/not significant, this development does not have any potential to alter the significance of effects associated with the proposed development. Any cumulative effect will be imperceptible/not significant. Thus, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the projects above.</p> <p>Land and Soils: Section 6.6.1 of the Inspector's Report (2019) referred to the Chief Executive's Report from Meath County Council which stated they were satisfied that <i>'the underlying geology of the area will not be unduly impacted upon by the proposed development'</i>. As such, there is no potential for significant negative direct nor indirect cumulative impacts on land, soils and hydrogeology as a result of the proposed and planned development.</p> <p>Water: In Section 8.5.5 of the Inspector's Report¹¹ (2019) prepared by An Bord Pleanála, the Inspector stated that <i>'I consider that the attenuation and disposal of surface water associated with the proposed development is generally acceptable'</i>. Therefore, it is concluded that there is no potential for significant negative direct or indirect cumulative effects on hydrology and water quality as a result of the proposed development and the planned development (ABP Ref. PL17.303568).</p> <p>Material Assets: It is assumed that this scheme will be constructed before construction commences for the Site Sustainability Project. In relation to Material Assets, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the projects above.</p>	

¹¹ Available from An Bord Pleanála, <http://www.pleanala.ie/documents/reports/303/R303568.pdf>

Plan/Project Ref No	Potential Cumulative Effects on Environmental Factors	Overall Cumulative Impact (if any)
	<p>Major Accidents and Disasters: The new development at Highfield Solar is at a much further distance from Indaver than the developments at Irish Cement. There is no risk to the planned development at Highfield Solar arising from the activities or the planned activities at Indaver.</p> <p>In conclusion, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from major accidents or disasters associated with the Indaver Site Sustainability Project in combination with the project above.</p>	

Table 18.3 Likely significant direct, indirect and cumulative effects¹² assessment of all projects listed in Table 18.1 taken together in combination with the proposed development

Plan/Project Ref No	Potential Cumulative Impacts on Environmental Factors	Overall Cumulative Impact (if any)
<p>Cumulative impact assessment of all projects listed in Table 18.1 together with the proposed development.</p>	<p>Population and Human Health: Overall, taking all of the projects together in-combination with the proposed development, cumulative population and health effects during the construction phase have been assessed to be imperceptible. Cumulative operational phase effects are also imperceptible.</p>	<p>None</p>
	<p>Traffic and Transportation: From a traffic perspective, taking the Indaver Site Sustainability Project in combination with all of the five projects listed above, it is considered that there is no potential for any significant negative direct or indirect cumulative impact to arise given the differences in construction programmes and construction routes and operational traffic flows between the projects.</p>	
	<p>Air Quality: Taken together, cumulative air quality impacts during the construction phase have been assessed to be imperceptible. Cumulative operational phase impacts are long-term and insignificant.</p>	
	<p>Climate: Cumulative impacts are considered neutral in terms of climate.</p>	
	<p>Noise and Vibration: The predicted noise effects associated with the proposed development at the Caranstown WtE facility are therefore well below those in the existing noise environment and hence will be imperceptible in terms of noise to its surrounding environment.</p> <p>On review of the projects discussed above, given their distance to the WtE facility and /or the low predicted noise levels associated with each, the cumulative effect of all projects operating simultaneously will result in a negligible change in the prevailing noise environment. The cumulative noise impact is determined to be not significant.</p>	
	<p>Biodiversity: It has been concluded that should the construction of any of the developments mentioned above occur concurrently, the potential cumulative effects will not be significant, given the distances involved, the implementation of standard construction environmental measures, the limited risk of significant effects, the dilution provided in the nearby watercourses and the distance from Natura 2000 sites. In the absence of significant emissions to water or air during operation or impacts from noise, no significant cumulative impacts on biodiversity during operation have been identified.</p>	

¹² It is noted that the terms “effects” and “impacts” are used interchangeably in this chapter and assessment.

Plan/Project Ref No	Potential Cumulative Impacts on Environmental Factors	Overall Cumulative Impact (if any)
	<p>When the predicted effects of the proposed development at Indaver are considered cumulatively with each planned project and cumulatively with all planned projects as a whole, it is concluded that there are no significant negative cumulative effects predicted on biodiversity.</p> <p>Archaeology, Architecture and Cultural Heritage: The majority of the proposed development lies within the footprint of ground which has already been archaeologically resolved and is predominantly brownfield. The impact of ground works on the small remaining areas of unstripped ground has been assessed as slight. Construction work for all these projects will require some degree of ground works, which in combination could have an impact on hitherto unknown subsurface archaeological finds or features. This would ultimately have a cumulative effect on the archaeological landscape in the vicinity of the Indaver development site and in the wider area. The more extensive the area of ground to be disturbed, the greater the risk of negatively impacting on potential subsurface archaeological finds or features. If such features are preserved by record they will be permanently removed from the archaeological landscape.</p> <p>Landscape and Visual: Overall, given the relatively small scale of the built elements in the proposed development, their location and positioning within the existing facility site and the existing industrial context within which they are placed, it is the assessor’s judgement in this case, that there are no additional effects caused by the proposed development when considered in conjunction with any of the listed proposed/permitted developments of the same or different types, which could be considered likely to create cumulative effects. These developments (as listed in Table 18.1), do not have any potential to alter the significance of effects associated with the proposed development. Any cumulative effects will be imperceptible/not significant.</p> <p>Land and Soils: A review of these projects has shown there are no planned projects which could contribute to any potential significant negative direct nor indirect cumulative effects on the land, soils or hydrogeology during operation of the proposed development. When the predicted effects of the proposed development at Indaver are considered cumulatively with each planned project and cumulatively with all planned projects as a whole, it is concluded that there are no significant negative cumulative effects predicted on soils, geology or hydrogeology.</p> <p>Water: From a water perspective, taking the Indaver Site Sustainability Project in combination with all of the five projects listed above, it is considered that there is no potential for any significant negative direct or indirect cumulative impact to arise given the location of the proposed development, the difference in construction programmes and the implementation of mitigation measures.</p>	

Plan/Project Ref No	Potential Cumulative Impacts on Environmental Factors	Overall Cumulative Impact (if any)
	<p>Material Assets: It is anticipated that the scale of the construction materials market in Ireland and the utilities capacity in the area are such that there will not be any significant negative direct or indirect cumulative impacts on material assets as a result of the proposed development.</p> <p>Major Accidents and Disasters: Taking the Indaver Site Sustainability Project in in combination with all of the five projects listed above, it is considered that there is no potential for any significant negative direct or indirect cumulative impacts to arise from major accidents or disasters, given the distance of these permitted projects and the proposed Site Sustainability Project.</p>	

18.4 Interactive Effects

18.4.1 Overview

All environmental factors are inter-related to some extent, and the relationships can range from tenuous to inextricable. The interactions between the identified environmental impacts have already been considered and assessed within the individual chapters of this EIAR. There have been numerous discussions and communications between the environmental specialists and the design team throughout the design process which helped to identify and minimise the potential for significant interaction of impacts. Measures to minimise impacts have been incorporated into the design and are also included in all of the assessments and the residual impacts have been assessed.

Table 18.4 presents the potential interactions between the environmental factors in a matrix format. It examines the potential for the environmental factor or issue in the left hand column to have an impact on the environmental factor listed in the top row of the matrix as a result of the proposed development. As discussed above, these potential interactions of impacts were identified throughout the design process and measures addressing these impacts have already been included within the individual chapters of this EIAR. The paragraphs following **Table 18.4** present an assessment of the potential interactions of impacts, mitigation measures and residual impacts. This assessment is based on information contained within this EIAR and the outcome of discussions and interactions between the environmental specialists and the design team.

The effects matrix examines the potential for the environmental effect in the left-hand column to have an interactive or indirect effect on the environmental medium listed in the top row of the matrix.

If there is the potential for an effect during the construction, this is indicated by a 'C'.

An 'O' indicates the potential for an effect during the operational phase.

'CO' indicates the potential for an effect during construction and/or operational phases.

If there is considered to be no potential for an effect, this is indicated by '-'.

Table 18.4: Interactive Effects Summary Matrix

Key Environmental Interaction Matrix	Population and Human Health	Traffic and Transportation	Air Quality	Climate	Noise and Vibration	Biodiversity	Archaeology, Architectural and Cultural Heritage	Landscape and Visual	Land and Soils	Water	Material Assets	Major Accidents and Disasters
Population and Human Health		CO	-	-	-	-	-	-	-	-	-	-
Traffic and Transportation	CO		CO	CO	CO	C	-	-	-	-	-	-
Air Quality	CO	-		-	-	CO	-	-	-	-	-	-
Climate	-	-	-		-	-	-	-	-	-	-	-
Noise and Vibration	CO	-	-	-		C	-	-	-	-	-	-
Biodiversity	-	-	-	-	-		-	-	-	-	-	-
Archaeology, Architectural and Cultural Heritage	-	-	-	-	-	-		-	-	-	-	-
Landscape and Visual	O	-	-	-	-	-	O		-	-	-	-
Land and Soils	-	C	C	-	-	C	C	-		C	-	-
Water	-	-	-	-	-	C	-	-	-		-	-
Material Assets	-	CO	-	O	-	-	-	-	-	-		-
Major Accidents and Disasters	CO	-	-	-	-	C	-	-	C	C	-	

18.4.2 Potential Interactions

18.4.2.1 Population and Human Health and Traffic and Transportation

The increase in population on the Indaver site during construction (contractors, etc.) and operation (additional employees) has the potential to increase traffic in the vicinity of the site. This potential impact was taken into account in the traffic and transportation assessment (**Chapter 7**). Significant negative residual effects will not arise.

18.4.2.2 Traffic and Transportation and Population and Human Health (via Air Quality and Noise and Vibration)

The increase in traffic associated with the proposed development has the potential to have an indirect effect on population and human health in the surrounding area through an increase in air and noise emissions.

This potential impact was taken into account in the Air Quality (**Chapter 8**) and noise and vibration (**Chapter 10**) assessment.

The change in AADT values during the construction and operational phases is not of the magnitude to require an air quality assessment as per the DMRB screening criteria. Therefore, no significant negative residual effects on air quality due to traffic are predicted.

A noise modelling assessment was completed and confirmed that the increase in traffic during the construction and operational phase of the proposed development will not result in any notable change in noise levels over existing road traffic noise levels. Therefore, no significant negative residual effects on noise and vibration are predicted.

18.4.2.3 Traffic and Transportation and Climate

The increase in traffic associated with the proposed development has the potential to have a direct impact on climate. This potential impact was taken into account in the climate assessment (**Chapter 9**).

During the construction phase, greenhouse gas emissions (in relation to an increase in traffic) during the construction phase will not be significant in the context of Ireland's total GHG emissions.

The change in AADT values during the operational phase is not of the magnitude to require a detailed climate assessment as per the DMRB screening criteria. Therefore, the traffic related CO₂ and N₂O emissions are imperceptible.

The proposed development will provide additional capacity for up to 15,000 tpa of hazardous waste. This will avoid the need for transport of this waste to mainland Europe for treatment. This will result in an overall reduction in transport-related GHG emissions due to the reduced distance for travel required.

This reduction is considered minimal but will result in a long-term, positive, imperceptible impact on climate. Thus, no significant negative residual effects are predicted.

18.4.2.4 Traffic and Transportation and Biodiversity

The increase in traffic as a result of the proposed development has the potential to have an indirect effect on biodiversity through increased noise emissions. The potential interactive effects of noise and biodiversity are described below in **Section 18.4.2.8**.

18.4.2.5 Air Quality and Population and Human Health

A potential interaction between air quality and population and human health during the construction phase of the proposed development was identified. Dust and other emissions generated during the construction works could have the potential to affect the surrounding population. Mitigation measures are proposed in **Section 8.6.1 of Chapter 8 Air Quality**. The conclusion of the assessment (**Section 8.8.1**) is that *“provided the dust minimisation measures outlined in Section 8.6.1 are implemented construction stage impacts to air quality are predicted to be short-term and not significant”*.

Impacts to air quality during operation are not significant therefore no mitigation is proposed. The site will continue to operate within the EPA IE licence conditions set for the plant, which will ensure no significant impacts to air quality occur.

As such, no significant negative residual effects on population and human health are predicted.

18.4.2.6 Air Quality on Biodiversity

Chapter 8 Air Quality concluded that the Waste to Energy Process (WtE) would be expected to be the dominant source of air emissions associated with the facility. The majority of this increase is intended for the treatment of aqueous wastes which, when evaporated, is converted to water vapour in the flue gas flow. As the flue gas flow is corrected to standard, dry conditions, the total flue gas flowrate will not increase. In any event, the facility will still be obligated to comply with its licensed emission limit values and maximum flue gas flowrate and thus the increase in waste tonnage proposed will not cause a significant impact to the ambient air quality.

It has been concluded that in the absence of any significant impacts on air quality, the effect on fauna via direct toxicological impacts or via bioaccumulation will be imperceptible.

18.4.2.7 Noise and Vibration and Population and Human Health

A potential interaction between noise and vibration and population and human health during the construction and operational phases of the proposed

development was identified. Mitigation measures are proposed in **Section 10.6** of **Chapter 10 Noise and Vibration**.

The conclusion of the operational noise assessment (**Section 10.8.1**) is that *“cumulative operational noise levels associated with the existing and proposed development can continue to operate within the facilities IED noise emission limits. The overall effect is imperceptible to not significant when added to the prevailing noise environment.*

The conclusion of the construction noise assessment (**Section 10.8.2**) is that significant residual effects will not arise.

Therefore, no significant negative residual effects are predicted.

18.4.2.8 Noise and Vibration and Biodiversity

Increased noise emissions have the potential to have a direct effect on biodiversity during the construction of the proposed development. As discussed in **Section 11.5.1** of **Chapter 11 Biodiversity**, bats which use the Indaver site, albeit in small numbers, are currently habituated to existing noise and activity levels and given no significant changes in the management of the facility will occur, bats are likely to continue to use the site during and post construction. Similarly, birds would already be habituated to the noise and disturbance of the existing Indaver facility and therefore should continue to use these fields during and after construction of the proposed development.

With regard to otter species, noise associated with construction works will be of negligible significance in the context of otter’s largely nocturnal habits, ability to move away from short-term disturbance and the negligible significance of increased noise and disturbance in the context of existing noise levels at the Indaver facility.

18.4.2.9 Landscape and Visual and Population and Human Health

A number of photomontages were prepared to assess the potential landscape and visual effect of the proposed development on population and human health.

The main potential sources of impact are likely to arise from the height, scale and mass of the proposed buildings, tanks, etc. The impacts on landscape and on visual amenity are however considered to be unlikely to be of a significant scale, given the relatively small scale of the proposed developments compared to the existing facility and the dominating presence of the nearby cement works.

Thus, no significant negative residual effects are predicted on population.

18.4.2.10 Landscape and Visual and Cultural Heritage

The potential interaction between landscape and visual and cultural heritage was considered in relation to Brú na Bóinne.

Chapter 13 *Landscape and Visual* assessed the views and prospects and concluded that the proposed development will not perceptively impact on the sensitive views from Brú na Bóinne or indeed from any views from distance.

18.4.2.11 Land and Soils and Traffic and Transportation

Excavated material will be required to be removed off-site and this will result in an increase in construction traffic. This has been assessed in **Chapter 7 *Traffic & Transportation***. No significant negative residual effects are predicted.

18.4.2.12 Land and Soils and Air Quality

The excavation of land and soils will generate dust emissions during the construction. This has been assessed in **Chapter 8 *Air Quality***. With the implementation of mitigation measures, no significant negative residual effects are predicted.

18.4.2.13 Land and Soils and Biodiversity

The proposed development will include the removal of habitats on site to facilitate the construction works. There will be no significant direct loss of the habitats given the low value of the habitats identified on site to be removed.

Construction activities such as excavation works, and truck movements have the potential to have an indirect effect on biodiversity due to the generation of dust. Following the implementation of standard dust minimisation measures construction stage impacts to air quality are predicted to be short-term and not significant. Given that there are no sensitive or high value habitats within the site or in proximity to it, any impacts from dust generation will be short-term and imperceptible.

18.4.2.14 Land and Soils and Archaeology, Architecture and Cultural Heritage

Excavation of land and soils during the construction phase of the proposed development has the potential to have a direct effect on archaeology.

It is possible that hitherto unknown archaeological finds or features may be present under the overhead power line in Area 13 and under the berm in Areas 1 and 2 (ref. **Figure 4.4** of **Chapter 4 *Description of the Proposed Development***) where the land has not been disturbed previously. The potential impact of construction works in these areas has been assessed as slight given that no archaeological finds or features were found in proximity to Areas 1 and 2 and given the limited area of ground to be disturbed in Area 13.

During construction, archaeological monitoring will be carried out in these areas.

Therefore, no significant negative residual effects are predicted.

18.4.2.15 Land and Soils and Water

Excavation works during construction have the potential to cause a direct impact on water quality through siltation as a result of runoff.

This could result in a short-term moderate slight effect. However, the implementation of suitable mitigation measures as detailed in **Chapters 14 Land and Soils** and **15 Water**, will ensure that there will be no significant negative effects on water quality.

18.4.2.16 Water and Biodiversity

The potential for surface water to become polluted through spillages such as hydrocarbon leaks (fuel/oil/lubricants) from construction machinery or by siltation as a result of run-off during construction has the potential to have a direct effect on biodiversity, specifically the aquatic ecology.

However, the potential impacts on water quality are low as the drainage ditches within the site boundary are seasonal and will not have running water during dry periods. Given the short term nature of construction works, the existing surface water management systems, the implementation of standard mitigation measures, the limited and seasonal flow in drainage ditches and the Cruicerath Stream and the dilution provided in the River Nanny (located approximately 2km south), any direct impacts on water quality and aquatic ecology will be localised, short term and not significant during construction works and imperceptible in the long term.

During operation, there is a potential interactive effect from storm water runoff on aquatic ecology. However, the existing storm water drainage system on site has sufficient capacity to adequately deal with any additional surface water arising from the expanded site during operation. Existing controls are already in place to deal with sanitary services, prevention of potential accidents and spillages, unloading of aqueous liquid wastes, management of firewater and transport of bottom ash and flue gas residues.

18.4.2.17 Material Assets and Traffic and Transportation

The import of engineering fill material and crushed stone and the export of surplus material from site is required during the construction phase of the proposed development and could have a potential interactive effect on traffic and transportation due to the number of vehicle movements required to transport the material to and from site. This interaction was assessed in **Chapter 7 Traffic and Transportation**. The assessment concluded that there will be no residual effects associated with the construction of the proposed development.

18.4.2.18 Material Assets and Climate

During operation, the proposed development has the potential to generate approximately 160 tonnes of hydrogen gas for use as a clean fuel each year. This is generated from 10 GWh of electricity which would otherwise be lost as waste heat to the atmosphere over the air-cooled condenser on site.

As assessed in **Chapter 9 Climate**, the generation of this hydrogen gas has the potential to offset greenhouse gas emissions and has a positive interactive effect on climate during the operation of the proposed development.

18.4.2.19 Major Accidents and Disasters and Population and Human Health

During the construction of the proposed development there is a potential interaction of effects associated with human health and major accidents with regards to hazards associated with construction works as would be the case for any construction works. There are no special or unique hazards associated with the construction of the plant on this particular site that would not be encountered on any typical construction site for an industrial building. As discussed in **Section 5.14 of Chapter 5 Construction Activities**, a Health and Safety Plan will be prepared which will address health and safety issues from the design stages through to the completion of the construction and maintenance phases as required by the Safety, Health and Welfare at Work (Construction) Regulations 2013.

During operation phase, the HAZID&RA prepared identified potential accident scenarios for the existing facility and those associated with the proposed development for example bunker fire (existing scenario) and fire/explosion at the hydrogen generation unit (under the proposed development scenario). As described in **Section 17.6.2 of Chapter 17 Major Accidents and Disasters**, with all the existing and proposed site risk reduction measures in place, the risks associated with the identified accident scenarios were considered to be as low as reasonably possible (ALARP).

18.4.2.20 Major Accidents and Disasters and Land, Soils, Water and Biodiversity

There is potential for the proposed development to have an interactive effect on land, soils, water and biodiversity during the construction and operation of the proposed development under certain accident scenarios that were identified by the HAZID&RA.

For example, there is the risk of spills or leaks which could enter the ground and streams however effective implementation of the construction environmental management plan (CEMP) will help to reduce the risks to the environment associated with the construction phase of the project.

Accident scenarios were identified for the operation phase of the project for both the existing site and proposed development that could potentially impact land, soils, water and biodiversity. However, as described in **Section 17.6.2 of Chapter 17 Major Accidents and Disasters**, with all the existing and proposed site risk reduction measures in place, the risks associated with the identified accident scenarios were considered to be as low as reasonably possible (ALARP).

18.5 Transboundary Effects

18.5.1 Introduction

This section describes potential transboundary effects from the proposed Site Sustainability Project. The potential for transboundary effects arises as follows:

- Bottom ash could possibly be exported from the proposed development to continental Europe for recovery if there are no landfill or recovery options available at a given time. Refer to **Section 18.5.2** below.
- Boiler ash and flue gas cleaning residues from the proposed development will be transported to a salt mine facility in Northern Ireland (Carrickfergus, Co. Antrim) or to continental Europe (Hattorf and Wintershall Reutilisation Facility, which is an underground salt mine in Germany). Refer to **Section 18.5.3** below.
- Non-ferrous metals will be exported for treatment to mainland Europe.

18.5.2 Shipment of Bottom Ash to Continental Europe

Bottom ash is currently sent to three main landfill outlets for recovery as daily cover or as a road construction material on the landfill itself. Three landfills are currently utilised for this process, Knockharley Landfill Limited, Drehid Landfill and Ballynagran Landfill. This will continue for the additional bottom ash produced as a result of the proposed development (Refer also to **Section 4.4.1 of Chapter 4 Description of the Proposed Development** for further details on bottom ash volumes).

Section 16.5.3.10 of Chapter 16 Material Assets presents a detailed description of the existing available landfill options for bottom ash in Ireland. This also includes a detailed description of the existing licencing process for landfills. The existing licensing process which all landfills in Ireland are subject to, requires compliance with an ongoing environmental monitoring regime in the form of stringent licence conditions. This comprehensive monitoring regime ensures that material such as bottom ash when sent to landfill for recovery or disposal will not have a material environmental impact.

Section 16.5.3.10 of Chapter 16 Material Assets notes that bottom ash (including the additional bottom ash produced) may be exported to outlets in Europe which are already able to recover aggregates from bottom ash if there is no landfill capacity in Ireland. To provide for this alternative, the bottom ash storage building has been proposed and is described in **Section 4.5.5 of Chapter 4 Description of the Proposed Development**.

Should this option be availed of, the bottom ash would be stored on site in the bottom ash storage building until there is enough for export in a bulk consignment. Covered trucks would bring the bottom ash from the site to Drogheda Port for loading into a vessel, typically over a two or three-day period in the same vehicles that would transport the material to a national treatment facility if it were available.

Therefore, the potential for transboundary effects has been considered in this EIAR.

Bottom ash from waste incineration in EU countries, including the UK, Netherlands and Belgium, is processed for use as an aggregate in construction of roads or other large-scale projects. This processed material is known as incinerator bottom ash aggregate (IBAA).

The Green Deal Programme agreed between the Dutch Waste Management Association and the Dutch government represents an example of such reuse and specifies that at least half of the bottom ash produced will be suitable for use as 'freely applicable building material' since 2017.

There are currently a number of proposed bottom ash recovery developments in Ireland including Beaparc, Co. Meath and Drehid, Co. Kildare. If these developments become operational in the future, then they would provide an alternative to the current options of sending this material to landfill for recovery or disposal and the export of the bottom ash for recovery.

Section 16.5.3.10 of Chapter 16 *Material Assets* notes that as the export of bottom ash material would involve movement to another EU county, the requirements of Regulation (EC) No 1013/2006 of 2006 on shipments of waste would also need to be adhered to. The transfrontier shipment (TFS) of waste deals with the movement of waste between countries. A TFS will be sought to facilitate the shipment of this waste to Europe if this arises. The overall objective of the TFS Regulation is to implement measures for the supervision and control of shipments of waste in order to ensure that the movement, recovery, or disposal of waste, is managed in an environmentally sound manner, for the protection of the environment and human health. The Transfrontier Shipment of Waste (TFS) process is described in **Section 4.10.4 of Chapter 4 *Description of the Proposed Development***.

Section 16.5.3.10 of Chapter 16 *Material Assets* notes that the bottom ash residues from the plant are currently characterised as non-hazardous. The manner in which this material is treated and transported is dependent upon how this material is classified and characterised which may be hazardous or non-hazardous. Commission Regulation (EU) No. 1357/2014 and Commission Decision 2014/955/EU are utilised to determine the manner in which bottom ash may be characterised as non-hazardous or hazardous.

Section 16.5.3.10 of Chapter 16 *Material Assets* notes that should bottom ash be found to be a hazardous waste at some point in the future, the above treatment options are still suitable as the physical nature and composition of the bottom ash would not have changed. However, in this instance the facility accepting the waste would have to be licensed to accept this type of hazardous waste. Currently hazardous waste is exported from Ireland by ship for treatment in waste-to-energy facilities in Europe.

Therefore, the potential shipment of bottom ash to continental Europe is not likely to have significant negative effects on the environment. Thus, significant transboundary effects will not arise.

18.5.3 Transport of Boiler Ash and Flue Gas Cleaning Residues Northern Ireland and/or Continental Europe

Boiler ash and flue gas cleaning residues from the existing facility are currently shipped (un-treated) from the site to the Hattorf and Wintershall Reutilisation Facility, which is an underground salt mine in Germany. The facility has been approved for the reutilisation by the relevant authorities in Germany.

In 2017 a similar salt mine facility in Northern Ireland attained planning consent and an environmental permit to operate as a recovery facility for hazardous residues from waste to energy facilities. This facility in Carrickfergus, Co. Antrim has been accepting pre-treated boiler ash and flue gas cleaning residues from the existing waste-to-energy facility since October 2018 and the facility is also suitable for receiving the additional residues from the proposed development.

The salt mines in Germany and Northern Ireland are required to comply with the requirements of the EIA Directive and therefore were subject to the EIA process prior to the acceptance of any waste material. This Directive on Environmental Assessment aims to provide a high level of protection of the environment and to contribute to the integration of environmental considerations into the development of projects such as salt mines accepting hazardous waste with a view to reducing their environmental impact.

Similarly, the existing licensing process which all of these salt mines are subject to, requires compliance with an ongoing environmental monitoring regime in the form of stringent licence conditions.

The issuing of such licences by competent authorities pursuant to the requirements laid down in the Waste Framework Directive stipulate that all necessary safety and precautionary measures, monitoring and control operations and closure and after-care provisions must be included in the granting of all such licences.

Such conditions set out the legal constraints under which salt mines must operate in order to ensure that all operations are conducted in compliance with the requirements of the Waste Framework and Landfill Directives and do not cause environmental pollution.

Refer further to **Section 16.5.3.11** of **Chapter 16 *Material Assets*** for further detail on environmental aspects associated with the disposal of boiler ash and flue gas cleaning residues in salt mines.

The Transfrontier Shipment of Waste (TFS) process is described in **Section 4.10.4** of **Chapter 4 *Description of the Proposed Development***. A TFS is already in place for the export of treated boiler ash and flue gas cleaning residues between the existing Indaver facility in Meath and the existing salt mine facility in Carrickfergus, Northern Ireland. A TFS is also in currently place for the export of untreated boiler ash and flue gas cleaning residues between the existing Indaver facility in Meath and the Hattorf and Wintershall Reutilisation Facility, salt mine in Germany.

Additional boiler ash and flue gas cleaning residues will be generated from the proposed development. The additional volumes are presented in **Section 16.5.3.11** of **Chapter 16 Material Assets**. It is intended that the additional residues will be transported primarily to the salt mine facility in Northern Ireland (Carrickfergus, Co. Antrim) or to continental Europe (Hattorf and Wintershall Reutilisation Facility will be used as a back-up). Both of those facilities have the capacity to accommodate the additional residue volumes.

New TFSs or modifications to the existing TFSs (for both the Northern Ireland facility and the Hattorf and Wintershall Reutilisation Facility) will be sought to accommodate the increase in boiler ash and flue gas cleaning residues proposed as part of the proposed development.

As noted in **Section 16.5.3.11** of **Chapter 16 Material Assets**, Van Den Bosch is an international logistics services provider which transports un-treated boiler ash and flue gas cleaning residues for Indaver. Van Den Bosch confirmed that in the 51 years of its history none of its containers has ever fallen overboard and no ship has sunk with its containers on board.

If the un-treated boiler ash and flue gas cleaning residues come in contact with water, they will solidify. Thus, if there was a shipping accident, and the container entered the sea and was holed, the boiler ash and flue gas residues would solidify on contact with water. The solidified boiler ash and flue gas residues could then be removed from the seabed along with the container truck.

In addition, the monolithic pre-treated residues sent to Carrickfergus are already in block form as mentioned previously in **Section 16.5.3.11** of **Chapter 16 Material Assets**: *“As the material is already pre-treated and is in a solid monolithic form, as described in Section 4.5.6 of Chapter 4 Description of the Proposed Development, the transport of the pre-treated material is not likely to have significant negative effects on the environment.”*

Therefore, the potential treatment of the boiler ash and flue gas cleaning residues is not likely to have significant negative effect on the environment. Thus, significant transboundary effects will not arise.

18.5.4 Non-Ferrous Metal Recovery

Ferrous metals are currently sent for recovery in Ireland and non-ferrous metals are exported to mainland Europe for recovery. (Refer also to **Section 4.4.1** of **Chapter 4 Description of the Proposed Development** for further details).

Section 16.5.3.12 of **Chapter 16 Material Assets** notes that additional volumes of ferrous and non-ferrous metals will be generated as a result of the proposed development. **Section 16.5.3.12** of **Chapter 16 Material Assets** notes that same facilities that are currently utilised by the existing plant will be utilised for this additional material. Before granting the licence or permit, the competent authority will have already considered the effects on the environment of the facility accepting this material through the licence or permit application process. Consequently, the recovery or recycling of the additional non-ferrous metals is not likely to have a significant negative effect on the environment.

The recovery or recycling of the non-ferrous metals is expected to have a minor positive effect on the environment. Thus, significant transboundary effects will not arise.

18.6 Do-Nothing Scenario

The Do-Nothing Scenario (i.e. a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline thereof without implementation of the proposed development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge) is provided in each of the specialist of chapters. Refer to **Chapters 6-17** of the EIAR.

Each specialist assessment chapter (Ch 6 – 17) includes a detailed description of the baseline conditions with regard to the specific environmental aspect based on the best available environmental information and scientific knowledge. Each of these specialist assessments also includes an outline of the potential changes from the baseline scenario without the implementation of the project. In conclusion, if the project were not to proceed, significant adverse effects on the environment would not arise.

For clarity, the “Do-Nothing scenario” in the context of a “Do-Nothing Alternative” is discussed in **Chapter 3 Alternatives**.

18.7 References

Department of Housing, Planning and Local Government (2018) Circular PL 05/2018 -Transposition into Planning Law of Directive 2014/52/EU amending Directive 2011/92/EU on the effects of certain public and private projects on the environment (the EIA Directive);

Department of Housing, Planning, Community and Local Government (2017) Key Issues Consultation Paper on the Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licencing Systems;

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Department of the Environment, Community and Local Government (2013) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment;

Environmental Protection Agency (2017) Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft August 2017);

European Commission (2017) Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report;

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Louth County Council (2020) Find a Planning Application Available at:
<http://www.eplanning.ie/LouthCC/searchtypes>

Meath County Council (2020) View or Search Planning Applications Available at: <https://www.meath.ie/council/council-services/planning-and-building/planning-permission/view-or-search-planning-applications>

An Bord Pleanála (2020) Strategic Housing Development Applications Available at: <http://www.pleanala.ie/shd/applications/index.htm>

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