

1 Introduction

1.1 Planning application overview

- 1.1.1 This Environmental Statement (ES) has been prepared to support the outline planning application for Cardiff Hendre Lakes which is being submitted by Cardiff Parkway Developments Limited with all matters reserved for the following development:

“Construction of a business park (up to 90,000m² - B1, B2 and B8), ancillary uses, and infrastructure associated with; biodiversity; landscape; drainage; walking, cycling and other transport modes.

Together with the construction of a new transport hub facility, comprising railway station buildings (up to 1,500m² - Sui Generis) including ancillary uses, 4 no. platforms, surface car park (up to 650 no. spaces), and associated infrastructure works at land to the south of St Mellons Business Park.”

- 1.1.2 The ES also includes consideration of the planning applications that are being submitted to Newport City Council for the following:
- 1.1.3 Application 1: Public Right of Way: *“Full planning permission is sought for the installation of a new pedestrian footbridge for Public Right of Way St Mellons No.4A, at the junction with Heol Las and St Mellons Road, to provide a new active travel route across the widened Green Lane Reen from Heol Las into the proposed Cardiff Hendre Lakes development.”*
- 1.1.4 Application 2: Gas Pressure Reduction Station: *“Full planning permission is sought for the installation of a new wearing course surface, fencing, bollards and road markings north of the Gas Pressure Reduction Station, Heol Las, at the location of an existing agricultural access, to provide a new active travel route across the Green Lane Reen from Heol Las into the proposed Cardiff Hendre Lakes development.”*
- 1.1.5 Application 3: South of the Railway Line: *“Full planning permission is sought for the installation of kerbing, fencing and road markings associated with a new permanent access road and junction to the south of the Green Lane Overbridge, Heol Las, to provide a new railway maintenance access road across the Green Lane Reen from Heol Las into the proposed Cardiff Parkway Station. Plus the installation of an earthwork structure tie-in associated with a new penstock within the Green Lane Reen to control water flows..”*
- 1.1.6 The delivery of the improvements to the crossings of Green Lane Reen at St Mellons crossing and the pressure reduction station are dependent on the

acquisition of interests in land which are not currently within the applicant's control.

- 1.1.7 This ES has therefore been prepared to describe and assess two forms of development proposal; one which includes the core elements of the development described in Chapter 3 of this ES but does not include the improvements (to the crossings of Green Lane Reen and the pressure reduction station), and a second "optimal" form which does include those elements.
- 1.1.8 The improvements are proposed to enhance active travel connections between the proposed development and the Newport Council administrative area. Where there are impacts of the development proposal which only occur (or are only mitigated by) through those active travel connections, the term "optimal proposed development" is used to indicate that the development including those active travel connections is being referred to.
- 1.1.9 The ES reports the environmental effects of the proposed development, as described above (and referred to as the proposed development throughout the ES), which includes two distinct areas; the business district and the railway station element of the development, known as 'Cardiff Parkway'. The ES is submitted in accordance with the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (referred to as the 'EIA Regulations').
- 1.1.10 The determining planning authority is Cardiff Council (CC) although due to the site boundary bordering Newport, Newport City Council (NCC) has also been consulted during the preparation of the proposals. Details of this consultation are described in Section 2.4.

1.2 ES Structure

- 1.2.1 The ES contains the environmental information that is required by the EIA Regulations and comprises a number of elements that are outlined in the sections below:
- 1.2.2 **Non-technical summary (NTS)** – a report which summarises the findings of the EIA written in non-technical language. This is included as a standalone document in addition to at the front of the main ES: Volume I.
- 1.2.3 **Environmental Statement: Technical Assessments** - (this volume) includes the introductory chapters and the EIA topic chapters (4 - 16).
- 1.2.4 **Environmental Statement: Appendices** –includes the technical reports and data that accompany the technical assessments in Volume I.
- 1.2.5 **Environmental Statement: Figures** –includes all the figures that are referenced within this ES, however some figures relating to the description of development are integrated into the main text for ease of reference.

1.3 Site location and context

- 1.3.1 The proposed development covers an area of approximately 80ha as shown in Figure 1.1. It lies approximately 8 km from the centre of Cardiff and 9 km from the centre of Newport with the South Wales Mainline railway bisecting the site, defining two zones of land - north and south.
- 1.3.2 The existing character of the site reflects the historic Gwent Levels landscape, consisting of undeveloped farmland reclaimed from the sea, incrementally over the past 2,000 years. The Levels form a strip of flat land between the Bristol Channel and the hills to the north. A topographical survey shows a maximum range of between 4.7m and 6.3m AOD¹, with no clear patterns of gradient across the site.
- 1.3.3 The process of land reclamation created a distinctive patchwork of rectilinear fields subdivided by reed filled drainage channels, known locally as ‘reens’, and smaller field ditches. Historic surface ridging formed as a result from past land management practices is also present and well preserved.
- 1.3.4 Faendre Reen, lies within the proposed development, adjacent to the western edge of the site, is distinctive locally for its width and more naturalised, meandering course. Interior field boundaries also include native hedgerows

¹ Above ordnance datum (AOD)

and areas of dense vegetation which visually break up the site and restrict wider views, especially to the south. The larger and more open fields in the north-western area of the site are an exception to this.

- 1.3.5 In addition to the distinctive field boundary, overhead pylons (275kV National Grid Transmission Lines) are a dominant feature of the site. Other buried utilities which cross the site include a high-pressure gas main, two intermediate pressure gas mains (roughly parallel with each other), and a foul rising main (Dŵr Cymru Welsh Water).
- 1.3.6 The site lies between the area of St Mellons to the west and the village of Marshfield to the east. The St Mellons Business Park lies immediately north of the site boundary. The A48(M) lies to the north of the site which is connected via Cypress Drive which runs along the west of the site boundary and leads to Hendre Lake, an EU funded wetland habitat (not within the site boundary). A corridor of dense wooded vegetation exists on the western side of Faendre Reen within the site boundary.
- 1.3.7 The site is an ecologically sensitive landscape which includes part of the Gwent Levels - Rumney and Peterstone Site of Special Scientific Interest (SSSI) and Marshfield Site of Importance for Nature Conservation (SINC) within the site boundary.

1.4 The surrounding area

- 1.4.1 The site marks the transition point between the urban extent of east Cardiff and the rural Gwent Levels. Key areas within the site context are:
- **St Mellons** - Established low to medium density residential community dating from the 1970s-1990s. Served by several primary schools, a local centre and open spaces including Hendre Lake - the latter an EU funded wetland habitat connected to the reen network.
 - **St Mellons & Links Business Parks** is located immediately north of the site and comprises early 1980-1990s office-based business park typified by low density and car dependency. With the exception of the Heron Marsh pub this is mono-use development.
 - **Marshfield** is an established village community of approximately 2,500 residents, located 1km to the east of the site. The village has a historic core, including St Mary's church, a post office and convenience store.

The expanded areas of the village include areas of more modern suburban housing.

- **Gwent Levels** - Expansive, low lying landscape of historic and ecological value. This area forms an expansive green interface with the Severn Estuary to the south.

1.4.2 Existing connections to the site from the surrounding area include those that are described below.

- **Road access** - The site is less than 1.5km from the A48(M) with onward access to the M4. The site is connected to the A48(M) by Cypress Drive which forms a dual carriageway north of the northern edge of the site.
- **Public Transport** - The site is currently served by the 45B bus route which has a limited timetable. Routes 44, 45, X45, 64 and 65 serve St Mellons within walking distance of the site.
- **Walking and cycling** - The site location is walkable on foot from St Mellons and Hendre Lake Park. However, the route between these areas and the site is currently restricted by Cypress Drive and Faendre Reen.

A Public Right of Way (St Mellons No. 4A) crosses the site from east-to-west (although this is currently not accessible due to reens and hedgerows). National Cycle Network (NCN) 88 runs along Fortran Road, close to the northern edges of the site, heading eastward to Newport along St Mellons Road and joining traffic free paths in St Mellons to the west.

- **Rail and light rail transit (LRT)** - The South Wales Mainline runs through site. The site is located approximately 8km from Cardiff Central Station to the west and 9km from Newport Station to the east.

1.5 Site ownership

1.5.1 The proposed development site is in a number of different ownerships which are identified on Figure 1.2 and listed below:

- **Cardiff Parkway Development Ltd** have option agreements over the majority of the site, including the full extent of the areas where new

buildings and associated development is proposed, and areas which are required for essential environmental mitigation measures.

- **Cardiff Council** owns land to the west of Faendre Reen, including areas which are proposed vehicle access routes and green spaces associated with the proposed development.
- **Newport City Council** own land on the eastern edge of the site.
- **Wales & West Utilities** own land associated with a gas pressurising station
- **Network Rail** own the existing railway line, embankments and associated infrastructure within the rail corridor
- **Other land owners**, including a series of agricultural holdings, own areas of land to the south of the railway line.

1.6 Site history

1.6.1 The proposed development is set within the context of a wider business park allocation, which has been identified as a growth area in the Cardiff Local Development Plan (LDP) 2006-2026². Of specific relevance to the application site, LDP Policy KP2(H) allocates land to the south of St Mellons Business Park as a strategic employment site. As part of this allocation, essential/enabling infrastructure is identified, which includes the provision of a transport hub. This would consist of a new rail station served by relief line rail services connecting to the city centre and services to Cardiff Airport and London via Cardiff Central. Land to the south of the railway line is allocated for mitigation for any effects arising from the development in the north.

1.6.2 This strategic allocation is also supported by Policy T3 which outlines that new rail stations which can be easily accessed by walking, cycling and local bus services, facilitate rail park and ride, where appropriate, and meet the access needs of all users, will be supported. The proposed Cardiff Parkway station is also identified as strategic transportation infrastructure under Policy T7. It is within this context that the concept and rationale for the scheme has been developed.

² Cardiff Local Development Plan 2006-2026, Adopted 2016

2 Environmental Impact Assessment

2.1 Introduction

- 2.1.1 Environmental Impact Assessment (EIA) is required for certain categories of projects (as identified in the EIA Regulations) and involves a process of drawing together, in a systematic way, an assessment of a project's likely significant environmental effects which must be considered before development consent (planning permission) is granted.
- 2.1.2 The EIA process leads to the presentation of information about the proposed development, along with its associated environmental effects, within an ES for the consideration by the determining authority in deciding whether planning permission should be granted.
- 2.1.3 The EIA process itself includes key characteristics:
- **Systematic** – the EIA is comprised of a series of tasks that are defined by regulation and practice;
 - **Analytical** – the EIA must be used to inform the decision making rather than promote the project itself;
 - **Consultative** – the EIA process must allow for and provide opportunity for interested parties and statutory consultees to provide feedback on the project and assessments undertaken; and
 - **Iterative** – the EIA process should allow for environmental concerns to be addressed during the planning and design stages of the project.

2.2 Regulatory context

- 2.2.1 The requirement to undertake an EIA is prescribed in the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (the EIA Regulations). As defined by the EIA Regulations, the proposed development is not a Schedule 1 development (always requiring EIA), rather it is a Schedule 2 development being an urban development of more than 5 hectares (Schedule 2, 10 (a)).
- 2.2.2 As a Schedule 2 development, EIA is required if significant environmental effects are likely as a result of the:
- characteristics of development;
 - location of development; and/or
 - types and characteristics of the potential impact.

- 2.2.3 Due to the size of the proposed development, which covers approximately 80ha, and the location within an environmentally sensitive area, it was determined by the project team that an EIA would be required. No formal screening was requested from Cardiff Council.
- 2.2.4 Schedule 4 of the EIA Regulations lists the information that should be included in an ES. This is outlined in Table 2.1 below together with details of where this information can be found in the ES.

Table 2.1 Schedule 4 Requirements for inclusion with EIA

Schedule 4 Requirement	Where assessed/ included in the ES
A description of the development, including details of the location, the physical characteristics of the whole development and the land use requirements during the construction and operational phases, a description of the main operational phase characteristics and an estimate of the type and quantities of emissions and residues.	Chapter 3
A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the applicant with an indication of the main reasons for the choice, taking into account a comparison of environmental effects	Chapter 3
A description of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development.	Chapters 4-16
A description of factors likely to be significantly affected by the proposed development. To include consideration of population, human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage, and landscape.	Chapters 4-16
A description of the likely significant effects of the development on the environment and, where appropriate, any proposed monitoring arrangements.	Chapters 4-16
A description of forecasting methods or evidence used to identify and assess the effects on the environment including any details of difficulties encountered compiling the information.	Chapters 4-16
A description of measures designed to avoid, reduce or, if possible, offset any significant adverse effects on the environment along with a description of measures designed to enhance beneficial effects.	Chapters 4-16
A description of potential significant effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters.	Considered within each of the assessment chapters where relevant.

Schedule 4 Requirement	Where assessed/ included in the ES
A non-technical summary.	This has been prepared as a separate document and also included in the front end of the ES for completeness.
A reference list detailing the sources used for the descriptions and assessments included in the EIA.	References have been included in each of the ES chapters as footnotes.

2.3 EIA guidance

2.3.1 The EIA has been undertaken in accordance with best practice including:

- **IEMA Quality Mark** – this is run by the Institute of Environmental Management and Assessment (IEMA) and is based around a set of EIA Commitments, which organisations registered to the scheme agree to comply with. Arup are registered with the Quality Mark. The IEMA EIA Quality Mark provides registrants with a benchmark for their EIA activities and allows them to demonstrate their commitment to effective practice; and
- **Welsh Office Circular 11/99 Environmental Impact Assessment (EIA)** – this sets out guidance on what information and approach should be taken for an EIA. Whilst now over 20 years old, it is still relevant, providing helpful guidance.

2.4 EIA Scoping and pre-application consultation

2.4.1 Scoping is the process of identification, at the early stages of a project, of the likely potential significant issues that may arise as a result of a proposed development. As part of this process a request for scoping opinion is submitted to the planning authority (in this case Cardiff Council). Scoping helps to ensure that issues and potential effects are assessed at the appropriate level of detail within the EIA.

2.4.2 A request for a scoping opinion was submitted to Cardiff Council (CC) Planning Department on 5th July 2018. This request also formally informed CC that an ES would be submitted along with the planning application for Cardiff

Hendre Lakes. A scoping opinion was subsequently adopted on 25th September 2018 (Appendix A1).

- 2.4.3 CC consulted with a number of statutory consultees in the process of forming its scoping opinion and the ES has been prepared based on the scoping responses received. Full details of the scoping responses are included in Appendix A1 and each of the assessment chapters identifies how these comments have been addressed within the design development and topic assessments.
- 2.4.4 Scoping establishes what assessments will be carried out for the EIA and for what phases of the development they would apply to. This EIA considers potential impacts that may arise during the construction and operational phases. The proposed development is intended to have a life span of decades, and therefore there is little to be gained from including consideration of any impacts considered likely during any decommissioning phase. Should the proposed development site be returned to its current baseline state in the future, this would be assessed at that time.

2.5 Assessment methodology

- 2.5.1 Once the scope of the EIA had been established, individual environmental topics were subject to survey and investigation to establish the baseline conditions. This was followed by assessment to identify and predict the significance of the likely environmental impacts of the proposed development. The assessment methodologies applied are based on recognised best practice and guidance specific to each topic area; relevant details of assessment methodologies are provided in the appropriate assessment chapters of this ES.
- 2.5.2 The technical studies that have been undertaken for each topic area have generally followed the same approach:
- Collection and collation of existing baseline information of the study area in addition to any supplementary survey work required to fill any data gaps or to update any outdated information;
 - Frequent consultation with both internal specialists within the team and relevant external consultees. This has been both within and across topic areas;
 - Consideration of the potential effects of the proposed development on the existing baseline, followed by identification of possible design changes that would lead to the avoidance or reduction of predicted adverse effects (and likewise the enhancement of any positive effects);

- Assessment of the final scheme design and evaluation of the significance of any residual and cumulative effects; and
- Compilation of the relevant ES chapter.

2.5.3 Many of the environmental effects are relevant to more than one topic area and therefore, attention has been paid to the interrelationship between them where they exist. For example, the biodiversity assessment, has received input from the water resources and air quality assessments. In this way ‘in-combination’ effects have been considered throughout the assessment chapters.

2.6 Additional regulatory regimes

2.6.1 In addition to the EIA Regulations, other regulatory frameworks have been observed. These include:

- Habitat Regulations Assessment (HRA) – The UK Habitats Regulations are used to implement the EU Habitats Directive (Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora). An HRA is included in Appendix E21;
- The Water Framework Directive (2000/60/EEC) - The Project will aim to attain the highest achievable level of water quality standards. This would be achieved with the incorporation of Sustainable Drainage Systems (SuDS) into the design to improve the quality of the runoff from the proposed site; and
- The Sustainable Drainage (Approval and Adoption Procedure) (Wales) Regulations 2018. The SuDS must be designed and built in accordance with statutory SuDS standards³.

2.7 Identification and significance of effects

2.7.1 Schedule 4 of the EIA Regulations sets out the information that must be included within an ES. This includes aspects of the environment likely to be affected by the development; a description of the likely significant effects on the environment; and a description of the measures envisaged to prevent,

³ Statutory SuDS Standards for designing, constructing, operating and maintaining surface water drainage systems

reduce and where possible offset any significant adverse effects on the environment.

- 2.7.2 Developments may affect different environmental elements to varying degrees, and as agreed at Scoping, not all impacts arising from a development are of sufficient concern to require detailed investigation or assessment within the EIA process.
- 2.7.3 Within each chapter of this ES, definitions are given for what environmental receptors (or receiving environments) are being assessed along with a description of what changes Cardiff Hendre Lakes is likely to cause the affected receptors. This represents the scope of the assessment.
- 2.7.4 In broad terms, significance of an effect is defined to be a function of:
- Resource value (international, state or local level importance)/receptor sensitivity;
 - Magnitude of effect (either adverse or beneficial); and
 - Temporal scale (temporary or permanent)
- 2.7.5 Each topic chapter defines what criteria have been used to establish resource value/sensitivity and magnitude of effect.
- 2.7.6 Unless otherwise specified within the assessment chapter, the definitions of timescales that have been used include:
- Short term: Up to 1 year:
 - Medium term: 1-5 years (to align with the length of the construction phase); and
 - Long term: greater than 5 years.
- 2.7.7 Professional judgement, along with relevant and accepted guidance is used within each assessment chapter to assess the interaction between receptor value (i.e. its importance or sensitivity) and the predicted magnitude of change to identify whether an effect is significant and what level of significance should be assigned (e.g. high, medium, low or negligible significance). In some cases, this is based on quantitative assessment whereas in others, it is only possible to use professional judgement and qualitative descriptions. In all cases, clear justification for the assessment approach has been set out along with all assumptions and limitations.
- 2.7.8 Where there are no topic specific standards/guidance for assessing significance, the criteria set out in Table 2.2 for sensitivity of receptor, and Table 2.5 for magnitude of effect, have been used within the assessments

Table 2.2 Definitions of sensitivity

Level of sensitivity	Definition of sensitivity examples
High	Environment is subject to major change(s) due to impacts: e.g. species present in nationally important numbers, or globally threatened; Special Area of Conservation; National Park; World Heritage Site; a panoramic viewpoint
Medium	Environment clearly responds to effect(s) in a quantifiable and/or qualifiable way: e.g. species present in locally important numbers; people travelling on roads; lowland agricultural landscape; an archaeological feature that is not unusual but cannot be considered common.
Low	Environment responds in a minimal way, or not at all, to effect(s) such that only minor, or no, changes are detectable: views from softwood commercial plantation; an archaeological feature that is common, or has been mostly destroyed; common, widespread species

2.7.9 The magnitude of the effect on the baseline can then be assessed considering the scale, extent of change, nature and duration of effect.

Table 2.3 Definition of magnitude

Level of magnitude	Definition of magnitude
High	Total loss or major alteration to key elements/ features/ characteristics of the baseline (pre-development) conditions such that post development character/composition/attributes of baseline will be fundamentally changed.
Medium	Partial loss or alteration to one or more key elements/ features/ characteristics of the baseline (pre-development) conditions such that post development character/ composition/ attributes of baseline will be partially changed
Low	Minor loss of or alteration of the baseline. Change arising from the loss/alteration will be discernible but underlying character/composition/attributes of the baseline condition will be similar to pre development circumstances/patterns
Negligible	Very minor loss or alteration to one or more key elements/features/characteristics of the baseline (pre-development) conditions. Change barely distinguishable, approximating to the “no change” situation.

2.7.10 Using these definitions, a combined assessment of sensitivity and magnitude can then be undertaken to determine how significant an effect is, as demonstrated in

2.7.11 Table 2.4. Where effects are classified as being of moderate and/or major significance (either beneficial or detrimental), the effect is considered significant in EIA terms. Table 2.5 provides a description for each of these criteria definitions.

2.7.12 The majority of assessments have used these criteria; however where there is deviation, this is explained and justified within each of the topic assessment chapters.

Table 2.4 Significance matrix

		SENSITIVITY		
		Low	Medium	High
MAGNITUDE	High	Moderate	Major or Medium	Major
	Medium	Minor or Moderate	Moderate	Major or Moderate
	Low	Minor	Minor or moderate	Moderate
	Negligible	Negligible	Negligible	Negligible

Table 2.5: Definition of significance levels

Significance	Criteria Definition
Major	These effects are likely to be key factors or important considerations at a regional or district scale but, if adverse, are potential concerns to the project, depending upon the relative importance attached to the issue during the decision-making process. They are generally, but not exclusively associated with sites and features of national importance and resources/features which are unique and which, if lost cannot be replaced or relocated.
Moderate	These effects, if adverse, while important at a local scale, are not likely to be key decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.
Minor	These effects may be raised as local issues but are unlikely to be of importance in the decision-making process. Nevertheless, they are of relevance in the detailed design of the project.
Negligible	Effects which are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

2.8 Cumulative effects

2.8.1 Cumulative effects are defined as those that result from incremental changes caused by other past, present or reasonably foreseeable actions/developments, in combination with the proposed development. They may result in effects that

are more than, or less than the sum of the individual effects. Chapter 17 sets out the Cumulative effects assessment which follows Advice Note 17: Cumulative Effect Assessment prepared by the Planning Inspectorate. The developments that have been considered within the assessment are identified in the chapter.

- 2.8.2 In-combination effects are different types of effects that interact and are experienced by the same receptor. For example, one residential receptor may experience noise and air quality effects at the same time, which in-combination may result in an effect that is greater than the sum of effects. These kinds of effects are addressed within each of the topic where appropriate and highlighted in the summary of effects in Chapter 17.

2.9 Assumptions and limitations

- 2.9.1 It has been assumed that information provided by third parties, including publicly available information and databases is correct at the time of publication.
- 2.9.2 Assumptions and limitations specific to environmental aspects are discussed in the relevant topic assessment chapters of this ES.

2.10 Project team

- 2.10.1 A multidisciplinary team has provided advice on the development proposals, identifying and addressing environmental issues that might arise. This team responsible for preparing the ES has included the following:

- Arup (all assessment chapters, except for the heritage assessment); and
- GGAT (heritage assessment).

- 2.10.2 Regulation 17(4) of the EIA (Wales) Regulations states that statements of competency for those who have prepared the ES should be included. These are provided in Appendix A4.

2.11 Application documents

- 2.11.1 The ES is being submitted to CC for determination as part of the planning application for Hendre Lakes. It is also being submitted to NCC for determination of the applications which fall within their jurisdiction.

- 2.11.2 Table 2.6 lists other documents submitted.

Table 2.6: Application documents

Application documents
Design and Access Statement
Pre-application consultation report
Environmental Statement
Non-Technical Summary of Environmental Statement
Transport Assessment
Flood Risk Assessment and Drainage Strategy
Planning Statement (one for the Cardiff outline application and one for the 3 Newport detailed applications)
Package of drawings for approval (one for each separate application)

3 Proposed Development

3.1 Description of the proposed development

- 3.1.1 A planning application has been submitted to Cardiff Council for the proposed Hendre Lakes development with all matters reserved for the following development:

“Construction of a business park (up to 90,000m² - B1, B2 and B8), ancillary uses, and infrastructure associated with; biodiversity; landscape; drainage; walking, cycling and other transport modes.

Together with the construction of a new transport hub facility, comprising railway station buildings (up to 2,500m² - Sui Generis) including ancillary uses, 4 no. platforms, surface car park (up to 600 no. spaces), and associated infrastructure works at land to the south of St Mellons Business Park.”

- 3.1.2 In additional full planning applications have been submitted to Newport for the following development:

- 3.1.3 Application 1: Public Right of Way: *“Full planning permission is sought for the installation of a new pedestrian footbridge for Public Right of Way St Mellons No.4A, at the junction with Heol Las and St Mellons Road, to provide a new active travel route across the widened Green Lane Reen from Heol Las into the proposed Cardiff Hendre Lakes development.”*

- 3.1.4 Application 2: Gas Pressure Reduction Station: *“Full planning permission is sought for the installation of a new wearing course surface, fencing and road markings north of the Gas Pressure Reduction Station, Heol Las, at the location of an existing agricultural access, to provide a new active travel route across the Green Lane Reen from Heol Las into the proposed Cardiff Hendre Lakes development.”*

- 3.1.5 Application 3: South of the Railway Line: *“Full planning permission is sought for the installation of kerbing, fencing and road markings associated with a new permanent access road and junction to the south of the Green Lane Overbridge, Heol Las, to provide a new railway maintenance access road across the Green Lane Reen from Heol Las into the proposed Cardiff Parkway Station; Plus the installation of an earthwork structure tie-in associated with a new penstock within the Green Lane Reen to control water flows, the south of the Green Lane Overbridge, Heol.”*

3.1.6 The various components of the proposed development are described in detail in the following sections. However, in summary the proposals include those listed in Table 3.1. Figure 3.1 shows the illustrative plan for Cardiff Hendre Lakes.

Table 3.1: Key elements of Hendre Lakes

Key elements	
Employment	Employment floorspace with a total of 90,000sq.m GFA ⁴ .
Railway station	A railway station building of up to 2,500m ² situated along the existing mainline railway, adding four additional platforms.
Transport interchange	A 650 space Park & Ride facility, bike storage facilities (cycle parking for up to 100 bikes), taxi rank and bus stops within 100m of the railway station and of each other, connected via a high-quality public realm.
Car parking	A Park and Ride car park at the station for up to 650 cars provided along with a limited number of on street parking provision (not yet defined). This is referred to as 'Station park and ride'. Parking provided for other land uses, but this will be on a plot basis and/or in shared parking areas. These parking allowances will be based on Cardiff parking standards.
Building heights	A range of building heights are proposed as shown on Figure 3.5. Building heights would be greatest around the station potentially being up to 64m (15 storeys including plant). Heights would reduce with distance from the station; the central area buildings would be up to 52m (12 storeys including plant), with buildings up to 28m (six storeys including plant) in the north east corner of the site. It is important to note that these represent maximum heights within the defined areas and that not average heights. Some buildings within these areas will be lower.
Building densities	There would be higher density development around the proposed station and public transport interchange. Further details of density is not yet defined.
Landscaping	A landscape which responds to the rich and sensitive heritage and ecology of the existing site. The landscape has been designed to have a number of functions including active travel, meeting space, play space, wildlife, waterways, recreation and trails.
Biodiversity	The ecological strategy for the development retains as much habitat as possible, creating more habitat than is removed and work towards net biodiversity gain.
Energy	A robust assumption is made that the energy from the site will be 'business as usual' being a mixture of electricity and gas. This would be reviewed at detailed design stage.
Drainage – foul	Foul water generated by the development would be transmitted via a new foul sewer network to the existing DCWW sewers. Strategically located foul pumping stations would be required to pump foul water to the DCWW sewers.
Drainage – storm water	Sustainable drainage is at the heart of the development character with drainage reens being part of a long history of land management over this coastal flood plain.

⁴ GFA = Gross floor area. GFA represents the usable floorspace of a building, excluding external walls and circulation areas.

Key elements	
Flood management	To mitigate flood risk, there is a need to provide an area of land that would act as a flood water storage during storm events. This is known as ‘flood compensation’ and would be primarily located to the south of the railway.
Site levels	To reduce flood risk existing site levels need to be raised. Existing topography shows a maximum range of between 4.7m and 6.3m above ordnance datum (AOD). It is proposed that levels would be raised to at least 6.00m AOD which would require the import of approximately 300,000m ² of material.
Access and movement	Walking and cycling would be prioritised throughout the site. Access routes for pedestrians and cyclists would be created at various points around the site perimeter as well as throughout, connecting areas of the site to each other and to the communities surrounding it. Vehicle access into the site would primarily be from a new junction on Cypress Drive in the north-eastern corner of the site. A secondary access point would be provided from the west with an enhanced junction of Cypress Drive/Sandbrook Road. Tertiary access to the two development parcels north of the power lines would be via two new priority junctions on Cobol Road. The internal highway network has been designed to limit the proportion of traffic routing through the site.
Lighting	An overarching lighting hierarchy would be applied to the site suited to the different areas and uses. A detailed lighting strategy would be prepared at reserved matters stage.

3.1.7 A series of plans have been developed for the proposed development and included within the Design and Access Statement (submitted in support of the planning application). These are also included within the ES and listed below:

- Figure 3.1: Parameter plan
- Figure 3.2: Use and quantum
- Figure 3.3: Primary access points
- Figure 3.4: Landscape areas
- Figure 3.5: Indicative building heights
- Figure 3.6: Movement (street hierarchy, active travel network and public transport)

Employment

3.1.8 Employment floorspace (B1, B2 and B8 use classes) would be across all the developable areas of the site alongside ancillary uses. However, higher density would be concentrated around Cardiff Parkway rail station in an area of the site identified as ‘Station Square’. Buildings in this area would be taller with a more urban character than the other buildings located in ‘Hendre Street’ which would be the other main area of buildings.

3.1.9 Employment floorspace would comprise a total of 90,000sq.m across the site, and employment for approximately 6,000 people is anticipated.

Railway station

3.1.10 The new railway station, known as Cardiff Parkway, would be located to the south of the site along the existing rail mainline, which consists of two lines (four tracks); the main line and the relief line. The relief line would be slue⁵ to the south of the existing alignment to allow for the provision of four platforms which would have a footbridge provided between the platforms. A service yard would be provided to the west of the main station building.

3.1.11 The station would be located to the north of the railway lines comprise of a main concourse, including a mezzanine level, in a building of up to 18m AOD (approximately 12 m high).

3.1.12 It is anticipated that the station will be served by up to eight trains an hour between Newport and Cardiff and include direct trains to Bristol, London and the Midlands.

Transport interchange

3.1.13 The interchange would be the main point of arrival for people arriving to the site by bus and rail. It would be a space in front of the station building that provides opportunities to change between different modes of public transport, designed around a central plaza which would have ancillary uses such as food and beverage outlets. The interchange would also provide links to the wider cycle and pedestrian network.

3.1.14 A Park & Ride facility of up to 650 surface car parking spaces would be provided to the east of the railway station (north of the rail line), which would include wheelchair accessible car parking. Cycle parking facilities for up to 100 bikes, taxi rank and bus stops would be within 100m of the railway station and of each other, connected via a high-quality public realm of the interchange. There is potential for cycle hire providers such as Next Bike to install docking stations in the area (and throughout the development) but this is not currently included within the design.

Car parking

3.1.15 In addition to the park and ride car park associated with the railway station that would be integral to the interchange hub, car parking for other areas of the

⁵ Slue is a rail term to mean positioned on a curve

proposed development would be provided on individual building plots and/or in shared car parking areas, subject to the requirements of each development parcel and Cardiff Council Guidance. These parking areas across the site could accommodate up to 1,800 cars. EV charging points will be provided in line with guidance (10%) across all car parking areas, with passive provision provided for future upgrade.

Building heights

- 3.1.16 It is anticipated that taller and the tallest buildings would be located around the station, with less tall buildings located towards the north of the site. The locations and heights of the buildings will be the subject of an application for reserved matters. Details of the maximum heights for buildings are set out below.
- 3.1.17 An assessment of the impact of (the siting of) tall structures within the site will be undertaken as part of the Reserved Matters Application. This assessment will include consideration of the impact of shading of the reens and any consequential effects on reen habitats and wildlife.
- 3.1.18 The proposed development has been subdivided into three areas within which it is anticipated that buildings would have maximum storeys of:
- Station Zone: up to 15 storeys
 - Main Area: up to 12 storeys
 - Northern Parcels: up to 6 storeys
- 3.1.19 Figure 3.5 identifies the locations of the maximum building heights which would have a maximum floor to floor height of 4m. This would result in maximum heights being, 60m, 48m and 20m with an additional 4m for building plant at the top.
- 3.1.20 It is important to note that these heights represent the maximum heights and not average heights. The net total size of buildings will be limited by the total amount of proposed floor area within the proposed development. Not all buildings within each of these areas would be at these shown heights.
- 3.1.21 For the purposes of this ES a "Rochdale envelope" approach has been applied to the assessment of impacts associated with these building heights. That is, because the final dimensions of the buildings which will make up the proposed development (or optimal proposed development) are not known, flexibility is being sought with the planning permission to enable those dimensions to be fixed at the reserved matters stage. This ES therefore assesses the worst case impacts which may arise from the worst case parameter (or "envelope") of building dimensions which are described in this section. The information is

sufficient to enable the main or likely significant effects on the environment to be assessed, and mitigation measures described.

Building densities

3.1.22 There would be higher density development around the proposed station and public transport interchange which would characterise the business district. This would be the main concentration of activity within the proposed development which would reduce in density moving north across the site. Details of building densities would be determined during reserved matters stage.

Landscaping

3.1.23 A landscape area plan (Figure 3.4) has been developed based on eight principles:

1. Connected habitat;
2. Co-existence;
3. Sustainability;
4. Health and wellbeing;
5. Variety of landscapes;
6. Preserving the heritage;
7. Views; and
8. Thresholds and edges

3.1.24 The landscaping would be developed at detailed design stage but would maintain these principles to develop an approach that would be implemented across the whole site in a consistent way. In general, the site can be divided into three areas which align with the levels of management and maintenance that each area will require:

- **Natural areas to include trees, hedgerows and grassland:** the aim of these areas would be to achieve biodiversity net gains. Each area would have the characteristics of the habitat they are seeking to enhance and whilst not accessible, will have routes passing through them.
- **Civic areas including parks, squares and the community ‘spine’ of the development:** Landscaping of the civic areas would include planting to promote well being for employees and public using the space. Standard and semi-mature trees would be used to frame these spaces to provide a sense of place and continuity which would add to amenity whilst also providing additional biodiversity.

- **Plots (permeable and connective):** across the whole site there will be opportunities for landscaping planting to enhance the public realm and biodiversity. This includes roadside wildflower planting, rain gardens and swales, permeable paving, multi-purpose parking areas, roofs, living walls, micro-habitats and biodiverse native tree planting.

3.1.25 Areas identified on the landscape parameter plan are proposed to be set aside to provide the landscape setting for the proposed development, and the ecological mitigation. The design and construction of new cycle routes, footpaths and public realm will have regard to these landscapes, so that specific features are protected and enhanced. This includes the following areas:

- A) Wildlife corridor:** An ecologically rich corridor abundant with native habitats for dormice, woodlands, wet woodlands, following the alignment of the overhead powerlines and high-pressure gas mains.
- B) Main Park** An open space in the heart of the development, providing amenity to users, flood alleviation, sustainable drainage and habitat mitigation.
- C) Southern Mitigation Area** An area to be set aside for new habitats to compensate and mitigate for proposed changes to the field ditch and hedgerow network and other habitats to the north of the site.
- D) Reen offset areas** Strips of land on both banks of retained reens in the northern area of the site, which are safeguarded from built development, protecting reens and associated habitats as key elements of the SSSI, and providing access for management. (12.5m wide)

3.1.26 The agricultural land south of the railway line would be managed to provide ecological and landscape benefits. The open space west of Faendre Reen would be managed to provide access, ecological and landscape benefits.

Biodiversity

3.1.27 The proposed development has been designed around a strategy of integrated green and blue infrastructure (i.e. vegetation, greenspaces and water) which mitigates ecological loss and enhances overall biodiversity across the site.

3.1.28 The overall biodiversity strategy for the development is to create more habitat than is removed and work towards net biodiversity gain (Figure 7.4).

3.1.29 Notable strategies for ecological components include:

- The ‘Wildlife Corridor’, running north west to south east, comprising a line of double hedgerows, enclosed by a swathe of wet woodland along one edge, and hazel-dominated woodland and a scrub / species-rich grassland mosaic along the other edge;

- A 12.5m wildlife buffer around Ty Ffynon reën, running north east to south west, comprising 1-2m verges of vegetation suitable for water vole foraging on the reën banks, alongside a hedgerow set back from the reën (to avoid shading), providing further connectivity across the site for dormice;
- A network of 4.2km of new species-rich intact hedgerows, planted strategically throughout the proposed development to maintain connectivity for dormice and foraging / commuting bats;
- Maintenance and enhancement of all Primary reëns, and the introduction of 3.72km of new secondary reëns and ditches to replace those secondary reëns and ditches that will be lost;
- New woodland strip planting in the south, which when combined with the new woodland planting within the Wildlife Corridor, totals approximately 2.6ha (of 1.8ha dry woodland and 0.8ha wet woodland);
- 3.2 ha of new species-rich wet grassland planting and 8.9ha of new species-rich dry grassland planting;
- Mosaic of seasonally wet and dry grasslands and biodiverse native tree and hedgerow planting, including orchards, in the Main Park.

Energy

3.1.30 An assumption has been made that energy usage on the site would be electricity sourced from the main electricity network along with gas boilers for heating. Consultation with energy companies has confirmed that there is sufficient capacity within the network to provide the additional load.

3.1.31 In addition, the buildings of the proposed development would seek to integrate renewable energy generation where possible, on a building by building basis. They would also be constructed to be energy efficient across their lifetime to minimise the energy demand.

Drainage – foul water

3.1.32 The proposed development would generate domestic foul flows and as such dedicated new foul drainage networks will be needed to serve the proposed development to transmit the waste to the nearest Dwr Cymru/Welsh Water (DCWW) sewer. As no heavy industrial premises are proposed it is considered unlikely that non-domestic foul flows will be generated.

3.1.33 The new foul sewer networks proposed to transmit foul flows generated from the new development would follow the proposed road network with spurs located at each development plot to receive foul flows from Hendre Lakes. Due

to the topography of the site and existing location of DCWW sewer, foul pumping stations would be required.

Drainage – storm water drainage

- 3.1.34 Sustainable Drainage Systems (SuDS) would be implemented across the site which aim to manage rainfall on site using methods that mimic natural processes, by making use of the landscape and vegetation to control the flow, volume and quality of the surface water runoff. In addition to this, SuDS also provide amenity benefits by providing aesthetically pleasing and natural landscapes, and biodiversity benefits by creating habitats for wildlife and vegetated areas.
- 3.1.35 The proposed development is not expected to have sufficient demand for non-potable water to make rainwater harvesting a viable option. Ground investigation results have shown that the ground conditions have insufficient infiltration capability to discharge through infiltration. It is therefore proposed to discharge at an agreed runoff rate to the existing ree network which are located around the periphery of the development.
- 3.1.36 Appendix C3 includes the drainage strategy for the site and covers both foul and storm water drainage.

Flood management

- 3.1.37 The proposed development would introduce hard surfaces to an area of existing permeability and as such there is a need to provide an area of land that would be able to accommodate the water displaced from these previously permeable areas. An area to the south of the existing railway, named as a ‘flood compensation area’ would be created to act as the primary storage area for excess surface water, with smaller secondary areas integrated into the north of the site. The primary area has been designed to fit within the existing field patterns, so as to avoid removal of hedgerow. As part of the flood mitigation works it is necessary to widen of Green Lane Reen by 3m to the west, for a distance of 500m. The works would also include two new sluice gates south of the railway line controlling flow along Railway Reen and Green Lane Reen.
- 3.1.38 More details of this can be found in Chapter 5; Hydrology and flooding.

Site levels

- 3.1.39 The site sits on the edge of the Gwent Levels, marking the transition between the expansive flat, lowland areas to the south and east, the undulating topography of St Mellons to the east and north, and hills rising to the north. The site is largely flat with small localised level changes associated with reens, field ditches, and hedgerows. A topographical survey shows a maximum range

of between 4.7m and 6.3m AOD, with no clear patterns of gradient across the site.

3.1.40 The land north of the railway which will provide a platform for access roads, buildings, public realm areas and associated infrastructure would be raised to a minimum level of 6m AOD (refer to Flood consequences assessment in Appendix C1). This forms part of the flood mitigation proposals and is also critical for the proposed drainage strategy.

3.1.41 Materials for raising site levels would be brought to site on HGVs which would utilise the local and regional road network to reach the site. It has been estimated that 390,000m³ of material would be required. More detail related to materials is found in Chapter 15.

Access and movement

3.1.42 Figure 3.3 identifies the primary and secondary access points into the site. From Cypress Drive, Cobol Road and Hoel Las. Primary vehicle access would be from a new junction on Cypress Drive in the north eastern corner of the site. Cypress Drive would be reconfigured to provide priority to vehicles entering the site.

3.1.43 A secondary vehicle access point would be provided from the west, from an enhanced junction with Cypress Drive / Sandbrook Road provided as part of the proposed development. This would be reserved for emergency access and public transport.

3.1.44 The two development areas in the north of the powerlines would be accessed separately via new priority junction on Cobol Road.

3.1.45 Access routes for pedestrians and cyclists would be provided to create connections to:

- Cypress Drive in the NW corner of the site, and onward connections via the proposed Primary Cycle Route 'C2', linking paths into St Mellons;
- Sandbrook Road, and onward footpath routes linking to St Mellons;
- Hendre Lake Park in the south western corner of the site;
- St Mellons and Business Parks to the north of the site, via the street network;

3.1.46 Within the site, the street hierarchy would include the primary vehicle access road running from Cypress Drive to the station park and ride which would avoid the main central areas of development. Secondary streets would provide additional vehicle routes into the main body of the site and the north eastern parcels of the site providing resilience for gaining access into the site in the event the primary route was impeded. Tertiary streets would provide an

interconnected network of smaller streets providing permeability to all plots and supporting pedestrian movement away from vehicles.

3.1.47 A main spine route would be provided passing through the key public realm of the site and providing vehicle access for these areas. This would be designed to be lightly trafficked and of non-standard carriageway design to encourage low traffic speeds and cycling and walking priority.

3.1.48 The existing PRoW would be realigned within the development but would maintain the existing access points at similar locations. The layout of the site aims to prioritise walking and cycling with traffic speeds of 20mph or lower throughout the site. Wayfinding would be provided across the site to facilitate active travel by promoting the key active travel routes as the primary means of moving about the site. Figure 3.6 identifies the locations of the PRoW to be delivered across the site.

Optimal proposed development

3.1.49 The Optimal proposed development would include the following cycle and pedestrian improvements:

- St Mellons Road to the east of the site, and onward connections via National Cycle Network route NCN88;
- Heol Las, in the south eastern corner of the site, and onward access to the rural lane network.

Lighting

3.1.50 Lighting around the site would need to take account of access and safety requirements for use of the site in evening and night-time as well as ecological sensitivities and the need to minimise light pollution. Lighting would be tailored to the needs of the different areas of the site which would have distinctive characters and lighting requirements:

- **Station and station square:** this would be an urban environment requiring higher light levels to promote safety;
- **Public realm spine and access routes:** the aim of lighting would be to aid site legibility, particularly around key public spaces, and to provide safe environments for access (both footpaths/cycleways and traffic routes);
- **Waterways and habitats:** lighting levels would be lower in areas of waterways and ecological habitats, only being included for public wayfinding and safety.

3.1.51 In order to control levels of lighting across the site measures would be put in place which may include curfew periods (to reduce light levels during periods when less light is needed – typically between 11pm and 6am), control systems which may use dimming or timing, and careful selection and positioning of lighting. A detailed lighting strategy would be developed at reserved matters stage.

Construction access

3.1.52 Access onto the development site north of the railway line would be utilised for site construction activities including surveys, clearance, import of materials, workforce travel and export of materials. A combination of locations is likely to be used during the construction programme, with these reflecting different access requirements, constraints, and phasing of activities.

3.1.53 To provide flexibility of options two scenarios have been considered for the purposes of the EIA:

- All construction traffic movements north of the railway line utilise the existing access north of the gas reduction station access via Heol Las on the eastern boundary of the site.
- All construction traffic movements north of the railway line utilise the proposed secondary access at the Cypress Drive/Sandbrook Road roundabout on the western boundary of the site.

3.1.54 By assessing these two scenarios a robust assessment along the eastern, northern and western boundaries of the site has been undertaken, allowing flexibility in the final selection of construction accesses during delivery of the project.

3.1.55 Construction traffic movements associated with railway and mitigation works south of the railway line from Heol Las will be associated with both construction access scenarios.

3.2 Construction phasing

3.2.1 The implementation of the proposed development would be in a series of phases. The phasing together with what construction and other works are within each phase will be the subject to an application for Reserved Matters. Some of the phases may be entirely associated with undertaking mitigation works. An indicative phasing of the proposed development has been prepared. This has been informed by the following:

- Planning, permit and licences requirements;

- Ecology and landscaping which needs to take account of different protected species across the site and habitat capacity (where this is important in terms of relocation of species and habitat creation. The need to clear habitat also results in phasing implications due to seasonal constraints;
- Flood mitigation works which require the flood compensation area to the south of the site to be completed prior to land raising.

3.2.2 The phasing of construction (with indicative dates) is anticipated to be:

- **Enabling works:** over the period 2021- 2028:
 - **Infrastructure:** Prior to construction of buildings, it is necessary to create development plateaux consistent with the flood mitigation strategy, and associated habitat mitigation.

The initial phase will be to the south of Ty Ffynnon Reen and north of the railway line, which will facilitate construction of the station building and first commercial buildings. Associated with this will be construction of the main highway and associated buried services.
 - **Early phases:** The new station will be supported by the development of new buildings around the Station Square, creating a sense of arrival and ensuring that new development benefits from public transport access. The north eastern corner could be developed independently, and earthworks in this area could be undertaken as an early phase or in parallel.
 - **Middle and later phases:** Earthworks will be completed across the whole development area in a phased manner creating plateaux for future buildings and public realm. The phasing of these earthworks is to be finalised. In total, earthworks across the site are expected to take a minimum of 4-5 years.
- **Commercial development:** Commercial development (i.e. buildings) across the site will be phased in response to market condition but is anticipated to be approximately eight years (2021 – 2028).

3.2.3 Figure 3.9 sets out the illustrative phasing for the proposed development.

3.3 Construction environmental management

3.3.1 An outline Construction Environmental Management Plan (CEMP) has been prepared which contains control measures, and the standards to be

implemented throughout the construction of the works in order to avoid and reduce impacts during construction. Appendix A2 includes the outline CEMP and it is proposed that compliance with the CEMP is achieved through planning conditions.

3.4 Alternatives

3.4.1 Schedule 4(2) of the EIA Regulations states the following in relation to consideration of alternatives for a proposed development:

‘A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the applicant or appellant which are relevant to the proposed development and its specific characteristics and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects’.

3.4.2 The site itself is allocated for development of a business park within the Cardiff Local Development Plan (LDP) 2006-2026. Of specific relevance to the application site, Policy KP2(H) allocates land to the south of St Mellons Business Park as a strategic employment site. With this in mind, consideration of alternative sites for the proposed development and alternative uses for this particular site have not been included within the ES because decisions related to these matters have already been made and would have been subject to environmental review at that stage.

3.4.3 The focus in this section is therefore on how the design for proposed development has evolved since project inception, responding to the environmental assessment and business case work that has iteratively fed into the process.

Design evolution

3.4.4 The first step in the developing the strategy and design for the proposed development, different case studies were explored to identify changing trends and requirements in transit led development schemes. Examples included:

- Kings Cross, London;
- Chiswick Business Park, London;
- XiXi, Hangzou, China

3.4.5 The Chiwick and Hangzou examples involve business park development in areas that integrate waterways and wetlands into the design and were therefore particularly relevant as case studies to Hendre Lakes.

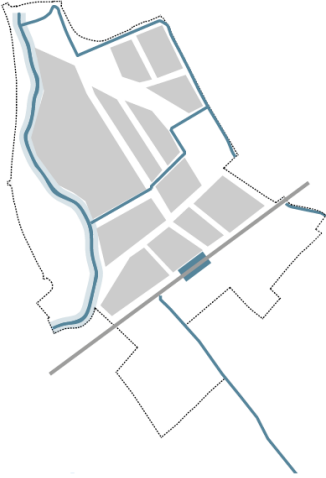
⁶ Cardiff Local Development Plan 2006-2026, Adopted 2016

3.4.6 During the initial stages of design development, a number of design scenarios were explored which included consideration of options for the reens, access into and through the site, habitat connectivity and flood and drainage requirements. Requirements for primary infrastructure were also fed into the design process at the early stages of design evolution.

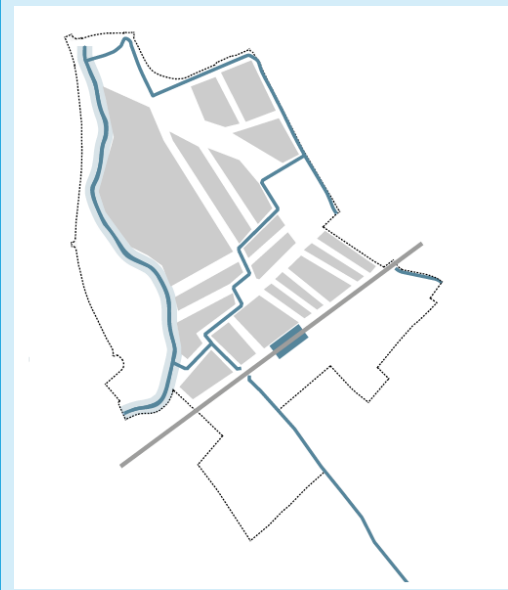
Reen restructuring

3.4.7 A number of scenarios were explored for how the extensive reens that exist across the site could be restructured to facilitate the type of development that was envisaged. The options set out in Table 3.2 were considered:

Table 3.2 Reen restructuring options

Reen restructuring options	Illustration of options
<p>Retention of all reens – this would involve construction to fit around the existing reen network. This was rejected as the plot sizes would be commercially unviable and make movement around the site difficult.</p>	
<p>Making changes to the main reens – this would involve moving Ty Fynnon reen further north to create a larger and unconstrained development area close to the station. This was rejected due to the loss of habitat and biodiversity that would result within the existing reen banks.</p>	

Working with the existing main ree network (Preferred Option) – This would retain the primary ree network whilst relocating most field ditches to allow a degree of flexibility in the future layout of the site and to create viable plots. This approach facilitates the retention of key features of the SSSI and historic landscape, along with key habitat areas.



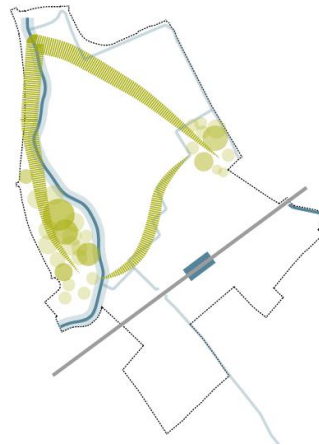
Habitat connectivity

3.4.8 Alongside consideration of restructuring of the ree network, connectivity of habitats has been considered, in consultation with NRW. Two main options for the site wide habitat strategy were identified which are set out in Table 3.3.

Table 3.3 Habitat connectivity options

Habitat connectivity options	Illustration of options
<p>A network of habitat areas – to include green bridges over the rail line to connect with habitats to the south. This was demonstrated to be too costly and would have involved creating structure over the main rail line which would create a safety risk and require agreement with Network Rail. It also creates habitat which does not have connectivity with its surroundings leading to potential resilience issues for species living in the area. This option was rejected based on these reasons.</p>	

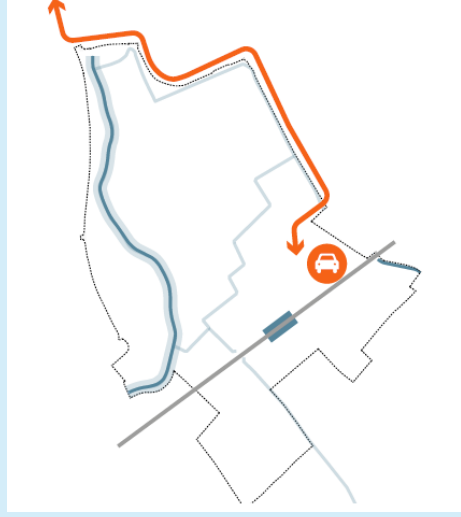
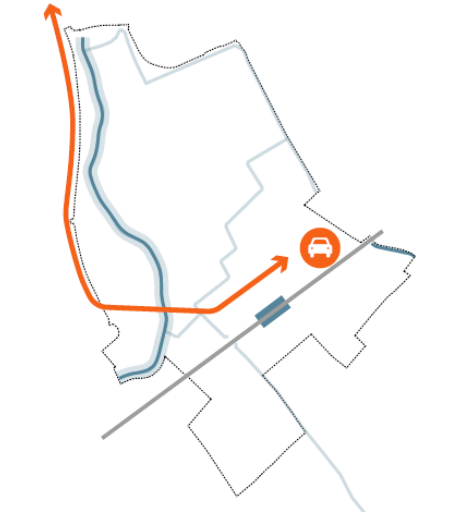
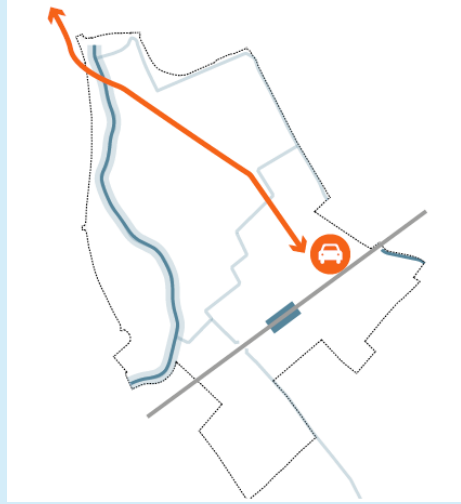
A contiguous habitat for wildlife (Preferred Option) – to include the creation and maintenance of a continuous connected habitat within the northern area of the site (forming an ‘inverted V’), along the utility corridor and linking with the existing habitat within the land to the west of the site under ownership of Cardiff Council. Additional planting is also proposed on the periphery of the reed protection zones creating an east-west corridor through the site. This was considered to be a preferable solution for enhancing ecology within and surrounding the site.



Primary access into, and through the site

3.4.9 Several options were considered for the location of the primary access point into the site and the alignment of the main access route to the proposed Cardiff Parkway station. Options considered include those identified below in Table 3.4.

Table 3.4 Primary access options

Habitat connectivity options	Illustration of options
<p>Access from the east – Improving highways and lanes on the northern and eastern edges of the site to bring traffic in from Hoel Las. This would provide direct access to the station park & ride, with traffic avoiding the centre of the development. It also brought traffic off Cypress Drive and thus reduced the impact on existing residences. This option would require significant upgrades to Hoel Las and roads within St Mellons business park, including significant widening impacting on Green Lane Reen. It also increased traffic along the National Cycle Network.</p>	
<p>Access from the west – Improving or realigning Cypress Drive to bring traffic in from the west directly to the station zone. This approach utilised Cypress Drive (which would have been widened). Traffic is routed through the southern area of the site but avoids the main development areas. This approach would affect ecology west of Faendre Reen and would also increase traffic flows past existing residences along Cypress Drive. It also resulted in severance of the station from the rest of the site by the primary highway – with resulting disbenefits</p>	
<p>Access from the North (Preferred option) – The route enters the site in the north western corner from Cypress Drive and is aligned through the site alongside the wildlife corridor. This provides direct access to the station area while passing on the periphery of the main development areas. This approach does not have a significant impact on existing residences on the lower portion of Cypress Drive and reduces traffic flows in front of the station. This route is preferred because it minimises impact on the existing area, is preferable in transport and place terms.</p>	

Flood and drainage risk management options

3.4.10 The iterative process of designing the development included assessing a range of options for managing flood risk and surface water. This process included assessing how to limit the volumes of aggregates required to allow the development to be constructed. The options assessed include those identified in Table 3.5.

Table 3.5 Flood and Drainage options

Flood and drainage options	
<p>Sacrificial voids – Land raised to protect access routes from flooding. The ground floor level of buildings would be elevated with sacrificial voids beneath the buildings to accommodate flood water. This option was discounted because it would require the import of more fill than initially anticipated (impacting on viability), would disturb buried peats, would require pumping stormwater flows, is a less flexible option and does not meet the requirements of TAN 15.</p>	
<p>Sacrificial basement parking – Similar to the sacrificial voids option but with larger voids to provide basement parking which could accommodate flood water. This option was discounted because it would require the import of more fill than initially anticipated (impacting on viability), would disturb buried peats, would require pumping stormwater flows, is a less flexible option and does not meet the requirements of TAN 15.</p>	
<p>Raised plateaux (preferred option) – Access, buildings and public realm would all be placed on a raised development plateaux. This allows future flexibility in the location of buildings and achieves a more resilient storm drainage strategy. It also creates a step-free public realm and protects buried peats for excavation works,</p>	

3.4.11 As is evidenced in the discussion above, the developed masterplan has been arrived at through an iterative design process based on engineering requirements, best practice design principals and environmental considerations. This evolution has allowed for the consideration of a number of design alternatives that were tested in order to identify the best fit for both environmental, business and commercial outcomes.