Harewood Whin Green Energy Park

Baseline Report

FEBRUARY 2025

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Acronyms and Abbreviations

Acronym	Expanded
CYC	City of York Council
DHN	District Heat Network
EV	Electric Vehicle
FBC	Full Business Case (Stage 3 of 3)
GEP	Green Energy Park
HWRC	Household Waste Recycling Centre
IDNO	Independent Distribution Network Operator
IRR	Internal Rate of Return
LAEP	Local Area Energy Plan
MRF	Material Recovery Facility
MPAN	Meter Point Administration Number
NPG	Northern Power Grid
NYC	North Yorkshire Council
NZF	Net Zero Fund
OBC	Outline Business Case (Stage 2 of 3)
PP&R	Poppleton Park and Ride
PPA	Power Purchasing Agreement
PV	Photovoltaics
PWA	Private Wire Agreement
RCV	Refuse Collection Vehicle
SOBC/SOC	Strategic Outline Business Case (Stage 1 of 3)
YPO	Yorkshire Purchasing Organisation

Executive Summary

Harewood Whin Green Energy Park (GEP) is a proposed renewable energy development on a former landfill site four miles west of York near Rufforth on the B1224. As part of developing the initial investment decision process, City of York Council (CYC) were successful in securing York and North Yorkshire Net Zero Fund (NZF) funding to develop an outline Business Case by 30th June 2025 .This Baseline report is a synthesis of currently available information, initial stakeholder consultation and relevant policy review on GEP progress to date and will form the baseline business as usual position part of the upcoming business cases.

The GEP project aims to contribute to the region's transition to net-zero carbon emissions by integrating a range of renewable technology options, potentially including a combination of solar and wind generation with battery storage and EV charging capabilities or hydrogen generation.

The GEP is anticipated to add renewable capacity to York's energy mix, contributing to the UK Government Clean Power 2030 Plan and supporting the city's ambition to decarbonise its energy system by supporting the CYC Plan 2023-2027 and York Climate Change Strategy 2022-2032.

This project is a discretionary function for CYC, with current funding only in place to the Outline Business Case stage. If approval/funding is obtained to progress to project implementation, it will not change current landfill maintenance operations and waste processing at Harewood Whin. However, the potential for renewable energy generation at Harewood Whin is significant, as long as planning, electricity grid, operational requirements, local stakeholder wishes, funding and potential commercial off taker challenges are overcome.

Previous GEP feasibility studies suggest onsite renewable generation could potentially supply all of Harewood Whin's operational energy requirements, with potential financial benefits being realised by selling excess energy for export. There is also an opportunity to decarbonise CYC waste fleet operations and achieve potentially significant CO_2 and fuel cost savings, however this would require significant investment to shift the current waste fleet to EV and transition associated infrastructure from Hazel Court depot (separate to this investment decision, but its decision being critical to future funding/operational approach beyond the outline business case).

As part of the GEP business case development, a long list of GEP generation options will be presented (outside of this report), with strengths, weaknesses, opportunities and threats calculated to identify a preferred way forward as the business case heads towards potential delivery of GEP solution.

As of January 2025, a planning application has been submitted for an initial solar development on site by Harewood Whin operators Yorwaste. The application is currently under review, with the potential to be revised to a smaller development due to glint and glare concerns raised by the nearby airfield. A separate solar farm development immediately adjacent to the north-west boundary of Harewood Whin towards Hessay has successfully achieved planning permission, possessing both risks and opportunities for the GEP, particularly around grid connection capacity which is particularly constrained for new generation in the area and could result in significant lead times for connection.

Despite risks to GEP development at Harewood Whin, a significant opportunity exists to repurpose unutilised land for sustainable energy generation and realise significant benefits through a brownfield development that harnesses renewable energy sources for CYC, Yorwaste, the City of York and the wider region. By transforming what was once a liability into an asset, GEP on landfill could exemplify innovation, sustainability, and the transformative approaches required by CYC and other local authorities to decarbonise operations and contribute to a sustainable future for their local industry and communities.

Below is a summary of the key considerations that have arisen from the baseline report:

Harwood Whin – Generation Capacity

- Maximum solar energy generation capacity from Harewood Whin site could reach 28MW. Based on an initial feasibility study, this array could generate 28,674 MWh of electricity per year.

Harewood Whin – Energy Demand

Annual electricity consumption recorded by Yorwaste at Harewood Whin was 962,670 kWh (2020/21), corresponding to an estimated 199.3 tCO_2e.

- Seventeen vehicles are currently stored onsite at Harewood Whin overnight, with more stored across several other sites. The total Yorwaste fleet consists of 38 vehicles, with mileage over 1,000,000 miles annually (which converts to an estimated 6,459,434 kWh of electricity demand), including vehicles stored at Harewood Whin, Seamer, Tancred and Thirsk. This corresponds to an estimated 1544 tCO_2e.
- At present, Yorwaste has indicated that the company has no plans to decarbonise its fleet as part of the development of the GEP, and no plans to transition their HGV refuse fleet to EVs, despite the company having wider decarbonisation targets.
- Renewable generation onsite could be used to decarbonise the operational energy consumption onsite, or charge the Yorwaste fleet in the event that the company transitions to electric vehicles in future.

CYC Energy

- The Council's annual electricity demand in 22/23 was 10,344,485 kWh. The council spent £3.6m on electricity in this period, with an average unit price of 0.31 £/kW, increasing to 0.40 £/kW for the 23/24 period. Therefore, at full solar capacity Harewood Whin could serve all the CYC electricity demand with additional capacity to spare.
- Currently the council fleet is stored at Hazel Court depot. This consists of 240 road vehicles, including ~70 HGVs; these operate in separate service lines, including waste, public realm, highways, building services etc.
- Approximately 95% of the fleet below 3.5 tonnes (cars and vans) has been converted to electric vehicles.
- Total fleet mileage in 2023/24 was 1,188,628 miles which translates to approximately 6,986,409 kWh of electricity demand if all vehicles were electric. The waste fleet HGV mileage accounted for 279,173 miles and is estimated to have resulted in 392.21 tonnes of CO_2 emissions which translates to approximately 1,640,900 kWh of electricity demand.
- The waste collection fleet that operates out of Hazel Court consists of 30 waste crews that drive to waste producers (domestic and commercial), then tip the refuse at Harewood Whin twice daily, returning to Hazel Court at 7pm.
- Hazel Court is equipped with EV infrastructure capable of supporting the smaller vehicles in the fleet, however a new depot will be required for the transition of the larger vehicles in the fleet.
- EV infrastructure to serve the fleet of smaller vehicles at Hazel Court was installed in 2021, including 35 Pulse7 7kW chargers with two sockets each, and 10 UltraCharge 50kW chargers, with a total cost of £1.12 million.

Grid Constraints

- Upgrading the capacity of the electricity connection from Harewood Whin to the grid is not straightforward, connection timeframes are potentially into 2032 and bring significant costs.
- Harewood Whin is located in an area where grid connection is constrained, with new connections being costly and time-consuming.
- Connection options are limited onsite, with three options identified - <1MW onsite, <10MW connected to Gale Lane 11kV connection and >10MW to Poppleton at 33kV. The Poppleton substation is at the end of the rural network and has limited capacity for new generation connections.
- Connection costs for 28 MW were previously quoted as £7,550,000 (excluding VAT).

- Consultation with Northern Power Grid has outlined that any connection above 1MW will not be available for 8-10 years.
- Without grid intervention, the maximum likely renewable installation at Harewood Whin before 2032 is 1.2MW which would serve approximately 50% of Yorwaste operations at Harewood Whin electricity demand.
- In December 2024, the Labour Party outlined a strategy to achieve their target of clean power by 2030, including a plan to address these grid limitations by investing in and modernising infrastructure. £40 billion is expected to be invested in the grid (generation and transmission assets) each year from 2025 to 2030, with the aim of nearly doubling the grids capacity and enabling projects like Harewood Whin to connect to the grid.

Solar2 Hessay

- Solar2 Ltd, a solar farm developer, has planning approval for a 49.9MW farm in the Hessay area adjacent north of Harewood Whin site.
- Solar2 has received a grid connection offer of ~40MW, which, due to constraints, is potentially greater than what the site is capable of delivering, allowing for expansion or extra capacity to connect.
- The developers have also been successful in Feed in Tariff Contract for Difference (CfD) auction and received support for 32 MW at a strike price of £50.07/MW which was outlined is around £74/MW in today's prices as the strike price is based on 2012 prices.
- Engagement with Solar2 has opened the possibility of collaboration with Solar2 on the development of a green energy park.

Based on the information reviewed for the baseline report

Figure *1* below shows the Baseline Do Nothing scenario of the with events that are planned to take place in the forthcoming years alongside the current timetable for key decisions on the CYC fleet.

Figure 1: Harewood Whin GEP – Baseline Do-Nothing Milestones Overview

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Policy						City of York Net Zero Target & HMG Clean Power Target					
Harewood Whin	Possible Planning approval once glint and glare issue resolved for 28MW	Install 0.172MVA and 0.260 MVA solar PV based on grid connection agreements						Grid Capacity available from to Gale lane for <10MW export capacity Grid Capacity available from Poppleton Sub-station for >10MW export capacity.			
Hazel Court	Site is constrained for activities being undertaken with no room for growth - insufficient space for full EV charging infrastructure		Decision to be made on replacement of 34 Refuse Vehicles with Diesel or Electric vehicles								
Hessay Solar 2	March 2025 - Grid Connection Milestone. Enable discussion on partnering to use spare connection capacity	Development of Solar array at Hessay next to HW. Planning approval 49.9MW, Grid agreement 40MW, and CFD agreement on 32MW export.									
First Bus	Electric Bus Fleet is decarbonised (86) with charging capacity during data at James's Street Depot										Net zero target including Pullman Coaches next to HW
CYC EV Charging Team		Potential commercial options available to develop EV charging at HW and/or supply Poppleton P&R									

The next phase of the GEP feasibility assessment will be to create a longlist of potential options for the GEP, and then develop and approach to support shortlisting the best options for Harewood Whin.

Project Timeline to date:

Month	Activity
Jan 2020	CYC completed a review of moving Waste Management Fleet from Hazel Court to Harewood Whin
May 2021	Yorwaste published an initial options report produced via Energy Oasis
Mar 2022	Yorwaste published a feasibility study for renewable energy production/Green Energy Park produced by Energy Oasis
May 2023	Grid connection offer for 28MW Solar for £8.5m (excluding VAT).
Sept 2023	Yorwaste submit planning for 28 MW solar
Feb 2024	CYC approved a project initiation, following Net Zero Funding of £243k to progress an Outline Business Case and to lead the project going forward.
July 2024	CYC Project Manager commences to deliver the Outline Business Case.
Oct 24	Arcadis commence as project consultants following competitive tender process to support the Outline Business Case work.

1 Strategic Context

Harewood Whin Green Energy Park (GEP) is a proposed green energy generation development located on former capped landfill site. This Baseline Report focuses on the strategic context to the project and existing solutions at Harewood Whin ahead of a separate follow-up to this document which will provide a long-list potential technical solutions for the GEP ahead of identifying short list and a preferred way forward for the project.

1.1 Strategic Driver for Investment

As part of the York and North Yorkshire Devolution Deal launched in February 2024 to create the North Yorkshire Mayoral Combined Authority (MCA), the UK Government provided £7m of Capital and Revenue funding for green investment initiatives to drive economic growth and contribute towards the ambition of York and North Yorkshire becoming a carbon negative region. The purpose and scope of the York and North Yorkshire Net Zero Fund (NZF) was split to into discrete components to progress the *development* and *delivery* of net zero projects. This included:

- Project Development Support (£1m revenue funding) to support the development of projects to build an investible pipeline of projects that will make a significant contribution to delivering net zero, energy security and economic growth (12 projects)
- Capital Grants for Project Deliver (£6m capital funding) enabling the delivery of net zero projects that otherwise would not happen. (11 projects)

Following CYC submission of the Harewood Whin GEP project application to the NZF in February 2023, CYC were successful in securing £243,500 of revenue funding from the Project Development Support fund in March 2023. This is to develop the GEP Strategic Outline Business Case (by 28th Feb 2025) and Outline Business Case (by 30th June 2025). Funding beyond this point (development of a Full Business Case) is currently not allocated and would have to be sought separately.

The NZF requires projects to deliver against one or more strategic priorities within York and North Yorkshire's Route-map to Carbon Negative. In particular, the GEP will align to the increase of low carbon energy generation and the improvement of energy infrastructure. There is also the potential for the project to align with other strategic priorities within the route-map, including the decarbonisation of transport, business and industry, depending on the final offtake of any green energy produced.

1.2 Rationale for Intervention - Policy & Strategy Alignment

The Harewood Whin GEP project aligns (and could potentially enable) key policies and plans that aim to decarbonise York and North Yorkshire.

1.2.1 UK Government Clean Power 2030 Plan

GEP's are likely to play a crucial role in the UK's Clean Power 2030 Plan by integrating multiple renewable energy sources and advanced technologies. These parks can centralise the production of clean energy, potentially combining solar farms, onshore wind turbines, battery storage systems, and green hydrogen generation facilities. This integrated approach aims to ensure a continuous and reliable supply of renewable energy, even when individual sources are less productive.

Solar farms within these parks could generate substantial amounts of electricity, while onshore wind turbines could harness wind energy to provide a steady power supply. The inclusion of advanced battery storage systems could also allow excess energy generated from solar and wind to be stored and used during periods of low generation, thereby stabilising the grid and reducing the need for fossil fuel backup.

Green hydrogen generation could be another key component, where renewable energy will be used to produce hydrogen through electrolysis. This hydrogen can be stored and later used as a clean fuel, either directly or through hydrogen fuel cells to generate electricity. This not only provides an additional source of clean energy but also enhances energy security by diversifying the energy mix.

Economically, the development and operation of GEP's could create jobs in construction, maintenance, and research, boosting the local economy and attracting investment. Environmentally, these parks will significantly reduce carbon emissions, helping the UK meet its net zero targets by 2030. The government is supporting these initiatives through policies and incentives, including subsidies, tax breaks, and grants, encouraging public-private partnerships to drive innovation and investment.

£40 billion is expected to be invested in the grid (generation and transmission assets) each year from 2025 to 2030, with the aim of nearly doubling the grids capacity and enabling projects like Harewood Whin to connect to the grid. Overall, GEP's could be instrumental in transforming the UK's energy landscape, ensuring a sustainable, secure, and economically beneficial transition to clean power by 2030.

1.2.2 CYC Plan 2023-2027

The CYC Plan adopted in September 2023 identifies 'Cutting carbon, enhancing the environment for future generations' as one of the council's key priorities. Increasing sources of renewable energy is central to achieving this priority (see objectives 5.1 - 5.5). The CYC Plan identifies "A fair, thriving, green economy for all" as another of the council's key priorities. The design, development, planning, and construction services required to deliver a GEP will provide an opportunity to return benefits to the local economy and develop the local supply chain capabilities.

1.2.3 York Climate Change Strategy 2022-2032

City of York Council (CYC) declared a climate emergency in March 2019 and set the ambition for York to be net zero carbon by 2030. To achieve this ambition, the council's net zero pathway requires a significant reduction in emissions across heating, transport, and energy systems. In order to decarbonise the local electricity system in York, additional renewable generation capacity will be required.

In 2018, the City's greenhouse gas emissions totalled 936 $ktCO_2e$, with the majority of emissions sourced from buildings (61.9%) and transport (27.9%). Energy is therefore a key part of the decarbonisation journey, sourcing energy that fuels buildings from renewable sources and switching to electric vehicles (EV's) for fleet and public transport. In order to meet the net zero carbon pathway, emissions in York will have reduced by 88% from 2005 levels, to 196 $ktCO_2e$ by 2030.

Increasing local renewable generation capacity across York is a key priority within the council's Climate Change Strategy (in support of objective 7.1). Battery energy storage could also potentially be delivered on site as part of the project supporting the council to improve energy flexibility and storage (in support of objective 7.2). Finally, there are a range of potential community benefits that this project could support including the provision of a community benefit fund and/or part community ownership of the asset (in support of objective 7.3).

To enhance any carbon savings, opportunities to generate additional carbon sequestration will be considered in the project development stage (in support of objectives 6.1 and 6.2). Carbon sequestration could, for example, be achieved through the planting of trees and hedgerows on the site.

1.2.4 North Yorkshire & City of York – LAEP & Zoning Technical Consultancy

The City of York Local Area Energy Plan (LAEP) estimates that 1GW of local renewable generation will be required to decarbonise the city's energy system. Currently, the City of York has a local renewable energy generation capacity of 23.5MW. To meet York's growing electricity demand and transition towards net zero, a drive towards increasing local renewable energy generation capacity is urgently required.

The former landfill site at Harewood Whin was identified within the LAEP as a suitable site for large-scale renewable energy generation. The proposed GEP could provide additional renewable capacity in York, and support York's transition to a low-carbon energy system.

The LAEP identifies Acomb to Rufforth as a "focus zone", an area where delivery of the plan should be prioritised. This area would include the landfill site at Harewood Whin which is between Acomb and Rufforth. The area has been identified as a focus zone because of high levels of fuel poverty, increasing the potential value of building fabric and heating improvements. For this reason, a District Heat Network (DHN) is suggested for the zone, even in the low ambition scenario. If this zone was built to connect both Acomb and Rufforth it would pass by the landfill site, providing an opportunity for it to be repurposed as an energy centre, generating low-carbon heat using heat pumps and the solar PV.

However, its unlikely that Acomb and Rufforth would be grouped together in a network like this, as the distance between them without any heat demand would significantly reduce the Linear Heat Density of a potentially network which is a key high-level indicator of commercial viability.

After the completion of the LAEP the Department for Energy Security and Net Zero (DESNZ) and City of York Council created heat network zoning studies on York as a part of the Zoning Technical Consultant (ZTC) UK wide studies. This study again identified parts of Rufforth as being a part of a zone where district heating could be viable, but didn't extend the zone to include Rufforth, likely because the impact it would have on linear heat density.

With the zone remaining in Acomb only, heat generated at Harewood Whin would need to be transported at least 3km under the B1224 to connect.

In the hydrogen section of the report, Hazel Court is identified as a candidate for hydrogen heating in the 2030 - 2040s, as it is in an area of industrial uses that may require hydrogen as a heat source for high temperature processes in the coming decades. It may make financial sense for buildings in these industrial areas to be heated by hydrogen, as it would avoid the need for air source heat pump installation at the constrained space at Hazel Court.

1.2.5 Minerals and Waste Joint Plan

The plan contains planning policies to support North Yorkshire County Council, City of York Council, and the North York Moors National Park Authority to take decisions about matters such as where, when, and how minerals and waste developments should be planned and controlled up to 31 December 2030. The Harewood Whin site is listed as an allocated site for ongoing waste management over the plan period within the Joint Plan. The GEP proposal will not change the current functionality of the Harewood Whin site; it will continue to operate as a capped landfill and the proposed technology options discussed in the report are considered a complementary use.

1.2.6 December 2024 Hydrogen Strategy Update

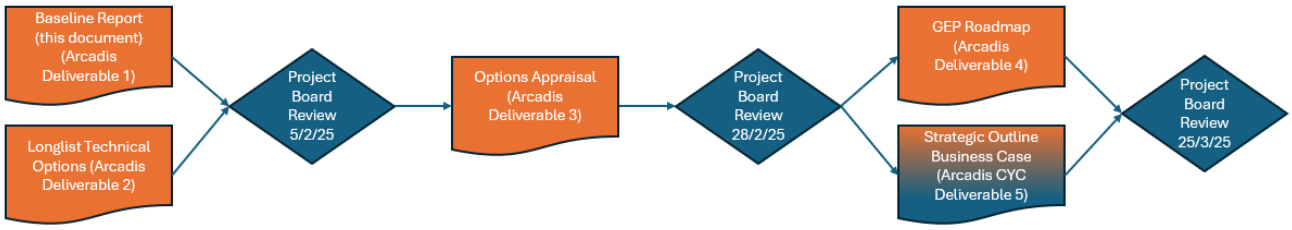
The latest update to the UK government's hydrogen strategy reiterated the importance of low-carbon hydrogen in the country's economic growth and in achieving net zero by 2050. Varied uses of hydrogen are detailed that will contribute to these goals, including as a low carbon power generation fuel in times of low yield from renewables, as a seasonal energy store, and as fuel for heavy vehicles. The update also details funding mechanisms for the development and construction of new low carbon hydrogen production plants, including the £240 million Net Zero Hydrogen Fund. The government seeks to support the development of hydrogen generation, applications, and infrastructure. The National Energy System Operator will be responsible for strategic planning of hydrogen transport and storage infrastructure from 2026.

1.3 Harewood Whin GEP Project - Organisational Overview

With the nature of this project potentially leading to the generation and sale of energy, the project is classed as a discretionary function for CYC, above and beyond mandatory council services. As such, with the project potentially impacting more than one ward in the city, it is classed as Key Decision as per Article 7.3 of the CYC Constitution. The CYC Executive is therefore the appropriate body to govern matters associated with this project and were consulted as part of the Harewood Whin GEP project initiation during the 20.02.2024 Executive meeting.

The CYC Executive at this meeting agreed to initiate the Harewood Whin GEP project and agree development of a Strategic Outline Business Case (SOC) for a preferred way forward. The SOC will be fed by this Baseline Report to form the Strategic Case within the Strategic Outline Business Case (SOC) and also the following Outline Business Case (OBC) for submission by end June 2025 and within the £243,500 NZF revenue funding. Execution of the project at an operational level is led by CYC a project manager, with external sustainability consultancy support provided by Arcadis reporting into a project board and CYC Executive at key milestones.

Figure 2: CYC GEP Project SOBC Development Pathway

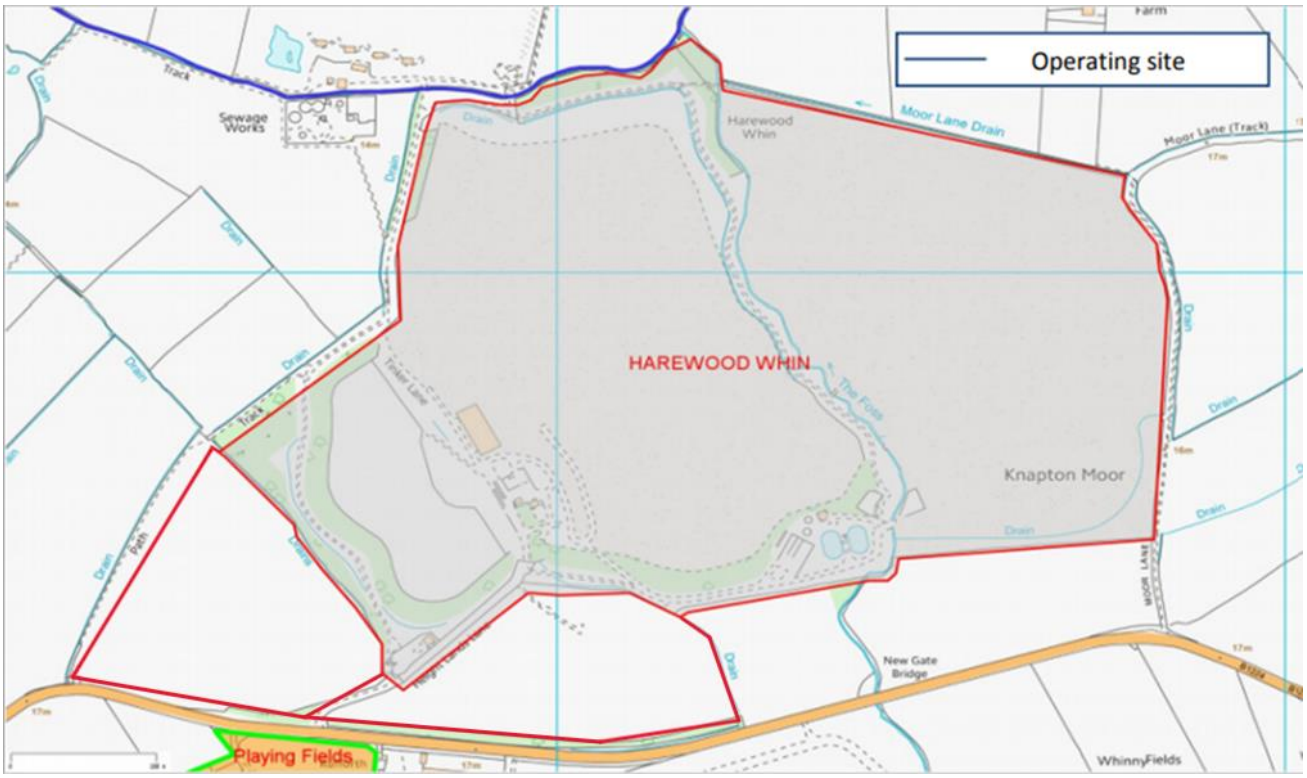


2 Project Context

2.1 Harewood Whin Site

Harewood Whin is situated to the north of the B1224. The site comprises approximately 82.47ha of land and associated buildings, including a materials recovery facility (MRF), waste transfer station and former landfill that now comprises a series of capped mounds. The site is primarily bordered by agricultural land with the village of Rufforth located approximately 1km to the west, Knapton 2km to the east and the city of York less than 4km to the east. The Foss, a stream, flows through the centre of the site.

Figure 3: Site Overview of Harewood Whin



Harewood Whin is owned by the council and is currently leased to Yorwaste Limited. The lease is scheduled to be renegotiated in due course, however it is intended that the GEP project will not involve changing the current functionality of the Harewood Whin site. The options being proposed with the renewable feasibility assessment will be complementary uses of the site, not interfering with the range of ongoing waste management operations onsite, including landfill methane recovery, green waste composting, commercial and industrial recycling, liquid waste treatment and general household waste recycling. Yorwaste was established as a Local Authority Waste Disposal Company owned fully by North Yorkshire County Council in 1991 with the aim of managing the council's landfill sites. In 1996, CYC became a 22.27% shareholder. The company operates in the York area with its current remit covering waste transfer stations, processing recyclates, garden waste and management and transport of waste.

Site surroundings include green belt land of primarily agricultural use, with a few exceptions. A sewage treatment works is located to the northwest of the site, and a bus depot and airfield to the south. Two fields adjacent south of the site are owned by Yorwaste and are impacted by legal covenants from the sale of the land that could impact development. The fields to the northwest of the site are subject to an approved planning application for a solar farm by Solar2 (Hessay land).

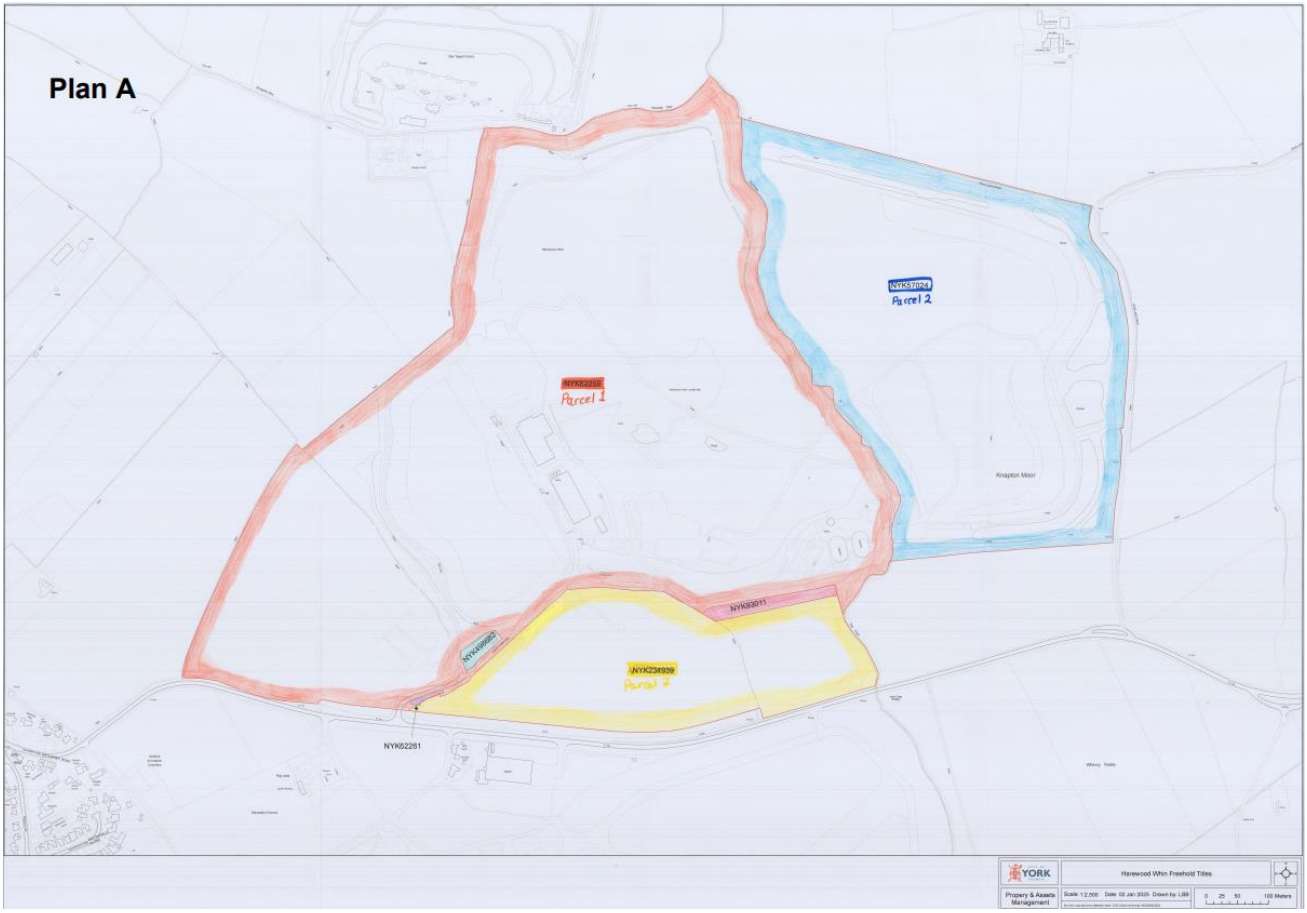
HW was previously in use as a landfill from 1988 - 2019, and is now capped with clay and geomembrane, with a leachate pond and methane management onsite. The site produces landfill gas which is sold to two third parties who use this gas as fuel to generate electricity (approx. 1MW) in generators located on the south of site which is sold to the grid.

Local residents and Rufforth Parish Council have previously voiced concerns over the use of Harewood Whin as a landfill and associated activities and will need to be engaged with as part of the options assessment.

A CYC Legal Services report was commissioned in January 2025 which describes the complex land titles at the Harewood Whin site. This report is available from CYC Legal Services.

The Site comprises several parcels of land registered at HM Land Registry with different freehold title numbers and some unregistered land. The extent of land comprised in the various freehold titles are shown in different colours on Site Plan A.

Figure 4: Harewood Whin Site Ownership (Plan A)

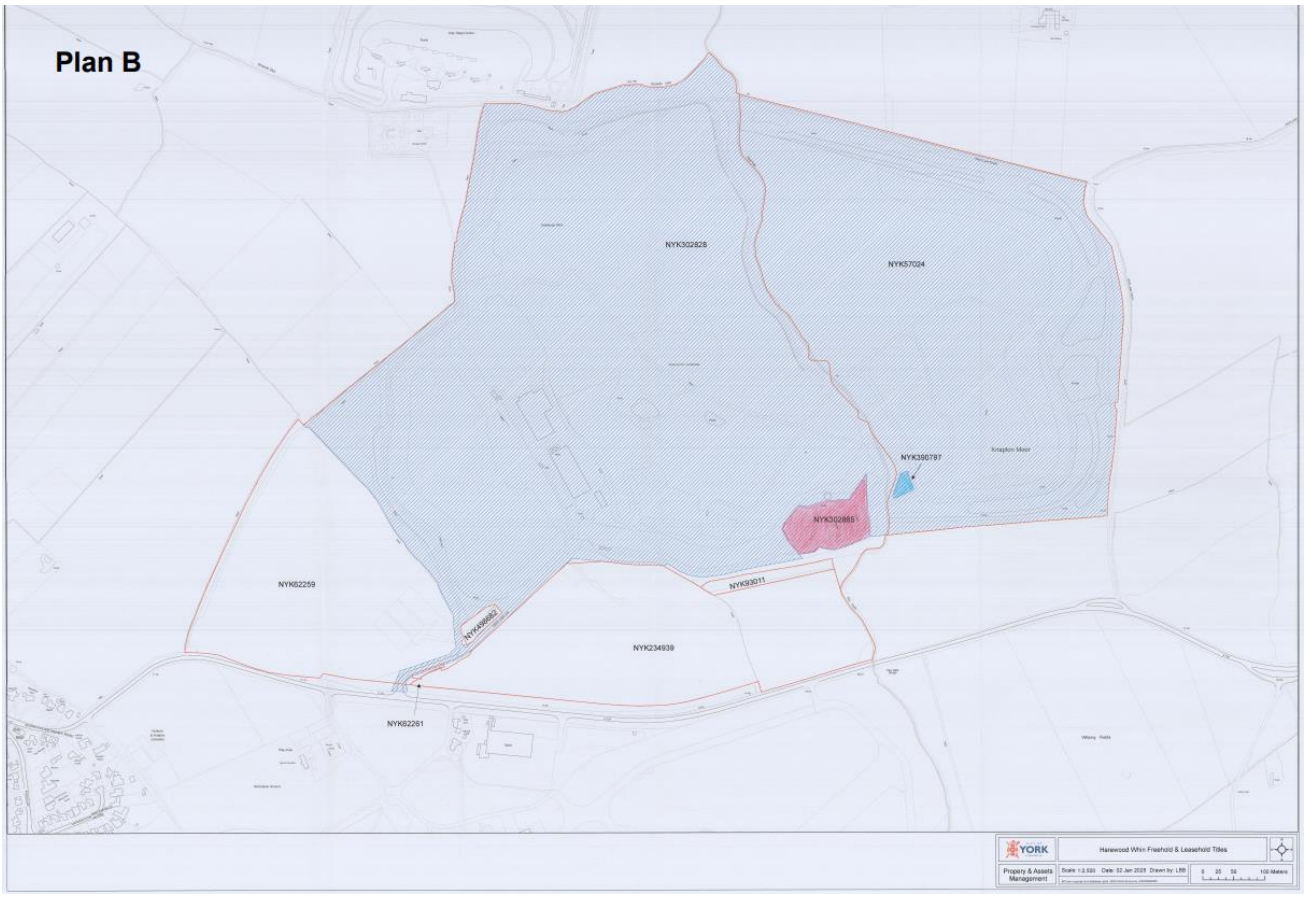


Site Plan A	Title	Registered Proprietor
Parcel 1 (Red)	NYK62259	CYC
Parcel 2 (Blue)	NYK57024	CYC
Parcel 3 (Not shown but small strip between 1&2)	Unregistered	Unknown (Likely CYC)
Parcel 4 (Red)	NYK93011	NYC
Parcel 5 (Purple)	NYK62261	NYC
Parcel 6 (Turquoise)	NYK498682	Richard Anthony Walker
Parcel 7 (Yellow)	NYK234939	Yorwaste

The Site is subject to several historical incumbrances such as rights granted by deeds and covenants on several portions of the Harewood Whin site which would need to be addressed prior to any development of a GEP. In particular, Parcel 7 (owned by Yorwaste) is subject to a pre-emption agreement in favour of Paul Antony Beckett and Linda Jane Beckett. If Yorwaste are willing to sell Parcel 7 to CYC on/before the expiry of the pre-emption period (21 June 2091) then they must first offer to sell it to Paul Antony Beckett and Linda Jane Beckett for its market value. CYC will only be able to purchase the land from Yorwaste if Antony Beckett and Linda Jane Beckett do not wish to buy Parcel 7 and/or they do not meet the timeframes to accept this offer.

The Site is subject to the three Letting arrangements summarised on Site Plan B.

Figure 5: Harewood Whin Site Ownership (Plan B)



Site Plan B	
Blue Hatched	Yorwaste Leasehold
Red Hatched	Yorwaste Leasehold
Blue	YLEM Energy (Subleasehold)

The Yorwaste Leasehold commenced from 5th May 2004 to 5th May 2019 and has expired. There is an option to take further leases to 5th May 2029, however this has not yet been exercised between CYC and Yorwaste.

Several Private Rights of Way are also present on the Site (as shown in Red on Plan C). In particular, Tinker Lane (used for access to the shooting club) is a Private Right of Way with restrictions. These would need to be addressed if a 3rd party such as the Hessay Solar2 development were to request access to their site via this route.

Figure 6: Harewood Whin Site Ownership (Plan C)

2.2 Electricity Grid Context

The United Kingdom's electricity grid is facing significant constraints as it adapts to the growing demands of the country, including increased demand and reliance on intermittent renewable energy sources like wind and solar. This has created challenges in balancing supply and demand, while the aging infrastructure struggles to support the transition to electric vehicles and decarbonised heating. In December 2024, the Labour Party outlined a strategy to achieve their target of clean power by 2030, including a plan to address these grid limitations by investing in and modernising infrastructure. Labour advocates for reform of the grid connection process and accelerating network delivery, focusing on expanding transmission capacity, upgrading interconnectors with Europe, and improving grid storage technologies. The strategy also emphasizes the development of smart grids and local energy networks to ensure more efficient distribution and integration of renewable energy. By enhancing grid resilience and flexibility, the government seeks to secure a sustainable, reliable energy supply while accelerating the UK's transition to net-zero emissions.

£40 billion is expected to be invested in the grid (generation and transmission assets) each year from 2025 to 2030, with the aim of nearly doubling the grids capacity and enabling projects like Harewood Whin to connect to the grid.

Engineering Recommendation G99 covers the requirements for the connection of generation equipment in parallel with public distribution networks and is a legal requirement for generators. Generators are classified into four different classes:

Type A: 0.8kW to < 1MW and connecting at a voltage <110kV
Type B: 1MW to <10MW and connecting at a voltage <110kV
Type C: 10MW to <50MW and connecting at a voltage <110kV
Type D: ≥50MW or connecting at a voltage ≥110kV.

It is the Generator's responsibility to ensure full compliance with the necessary Type classification. G99 applications will be processed in the order in which they are accepted by the DNO, and any subsequent applications will have to take their place in a queue. Securing schemes early in the G99 pecking order can therefore have a material effect on the ultimate costs of the proposed phases.

Northern Power Grid (NPG) is the Distribution Network Operator (DNO) who operates the local electricity network, serving 3.9 million customers in the United Kingdom. They oversee the grid connection process and advise on grid constraints that impact developments. The DNO manages a range of substations that step voltage down from the National Grid voltages of 400kV/275kV through 132kV; 66kV; 33kV; 11kV to 240/415V. Larger customers may be typically connected at 11kV or 33kV.

Given that there is a substantial amount of established infrastructure that takes time to modify, there are often constraints on the network that restrict where new generation or demand can be connected. A significant amount of planning and investment may be required according to the size of any new schemes and the nature of the existing infrastructure. The modelling has identified the need for significant network connection upgrades to achieve the full energy potential.

The Harewood Whin site is located to the west of York City on a rural grid network which is constrained for new generation. The network heatmap for electricity generation for the region has been reviewed against the existing sub-stations in Table 1 and shows as 'red' for the entire area, which means the grid is currently constrained for new connections.

Table 1: Substations in proximity to the site

Location Name	Substation type	Distance to Site (direct)	Nominal Voltage (NV)	Notes
Poppleton YO26 6PB	Bulk Supply Point	3.5 km	Upstream NV: NGET Downstream VN: 33kV	No capacity for generation without reinforcement of new substation. EHV connection.
Gale Lane YO24 3AF	Primary	3.6 km	Upstream NV: 33kV Downstream NV: 11kV	No capacity for generation without reinforcement of new substation or Extra High Voltage Feeder.
Severus Hill YO26 4RR	Primary	3.9 km	Upstream NV: 33kV Downstream NV: 11kV	No capacity for generation without reinforcement of new substation or Extra High Voltage Feeder.
Rawcliffe Lane YO30 5SW	Primary	5.2 km	Upstream NV: 33kV Downstream NV: 11kV	Generation headroom without reinforcement: 8.651 MVA Downstream voltage constraints. Some physical (location) constraint.

Securing a viable grid connection agreement will be an important requirement for the project to enable export and potential import of electricity to and from the Harewood Whin.

Under the electricity connection regulations NPG is required to consult National Grid on grid connections for projects that require a connection of 1 megawatt (MW) or more. Consultation with NPG has confirmed that generation of above 1MW is likely to require reinforcement to the grid network and for this area National Grid has highlighted that the timescale for connection is in the range of 8-10 years, as such the timeframe for connection is likely to be 2032-2034.

Rawcliffe Lane is not considered a feasible point of connection, due to the physical constraints of the substation and the distance between the site and the substation.

Generation of below 1MW would not require grid reinforcement, therefore will have a shorter timeframe and lower cost, but it was outlined that even this level of capacity could be hard to provide.

Poppleton is an Extra High Voltage (EHV) connection type, which would be required to be used for generation of above 10MW at 33kV connection. For generation below 10MW a connection at Gale Lane could be used on the 11kV network. The Poppleton substation is at the end of the rural network and has limited capacity for new generation connections. A summary of the likely grid export connection points from Harewood Whin is highlighted in Table 2 and timescales outlined for connection by NPG.

Table 2: Location and connection feasibility summary

Generation (export requirement)	Connection location	Timeframes Connection	Notes
<1 MW	Gale Lane	Time for installation (although potentially constrained)	One circuit breaker remaining for connection.
<1MW and <10MW	Gale Lane Substation	8 – 10 years	One circuit breaker remaining for connection. Grid reinforcement required.
>10MW	Poppleton EHV substation	8 – 10 years	Grid reinforcement required.

Connection applications have been made by Yorwaste as part of their analysis for installing renewables energy. The results show a high price for connection to Poppleton. The timescales provided are shorter than those provide by NPG in recent consultation in November 2024. Yorwaste has had accepted G99 connection offers to connect to two meter points on their site for smaller arrays. The details of these applications are provided in Table 3 below.

Table 3: Grid connection applications

Applicant	Connection Request	Connection location	Connection Timeframe	Connection Cost (£)	Status
Solar2*	40MW Export Import Unknown	Poppleton – 33kV	August 2026	Unknown	Assumed confirmed
Yorwaste	32 MW Export 8.7 MVA Import	Poppleton – 33kV	30 months (at time of quotation)	£8,480,000 (+VAT)	The offer was valid from 1 month in March 2023 so no longer valid
Yorwaste	0.260MVA Export 0.262 MVA Import	Waste Tansfer - Harewood Whin	Immediate following testing	£684.81 (+VAT)	Offer accepted and fee paid
Yorwaste	0.172MVA Export 0.172 MVA Import	Leachate Plant - Harewood Whin	Immediate following testing	£684.81 (+VAT)	Offer accepted and fee paid

*Based on consultation with Solar2

As of January 2025, The National Energy System Operator (Neso) has paused connections to the grid, with the aim of using the time to overhaul application rules that have allowed a surge of unfunded project proposals to join the queue, blocking the progress of legitimate green investments. Following the pause in grid connections, energy projects will be able to apply for a grid connection only during designated windows through the year and will be required to meet key progress milestones to keep their place, including proof of funding and prioritisation of green technologies. This may serve to progress viable projects such as the one at HW and reduce timescales outlined in this section.

2.3 Power Connection

Power connections refer to the methods and agreements by which electricity is generated, transmitted, and supplied to end-users, such as businesses, industries, and households. These connections can vary depending on the source of power, the structure of the agreement, and the relationship between the generator and the consumer.

2.3.1 Grid Connection

The most common type of power connection involves receiving electricity from the national or regional electricity grid, managed by utility companies or independent system operators. Energy is sourced from a variety of generation sources, which can be fossil fuels, renewables or nuclear.

2.3.2 Off Grid Connection

Off-grid power systems operate independently of the electricity grid. Power is generated on-site using renewable sources or generators.

2.3.3 Private Wire Connection

A private wire connection involves a direct physical connection between a power generator, for example a renewable energy installation, and a specific customer, asset or site.

2.3.4 Power Purchase Agreement (PPA)

A PPA is a long-term contract between two parties, the party which generates electricity (the energy producer) and one which purchases the generated electricity (the buyer). Types of PPA include:

- **On-site PPA** where the producer installs renewable energy systems of the buyer's property and supplies power directly through a private wire
- **Off-site PPA** where the producer supplies power to the buyer through the grid from a remote renewable installation.
- **Physical PPA** where the buyer physically receives power generated by the producer.
- **Virtual PPA** where there is a financial agreement in place where the buyer doesn't physically receive the power but pays a fixed rate for the renewable energy whilst still being credited for its environmental benefits, for example through Renewable Energy Certificates.
- **Sleeved PPA** where a renewable energy producer sells electricity to a buyer through an intermediary, typically an energy supplier. The utility or supplier "sleeves" the renewable energy through the grid to the buyer, handling the logistics of energy delivery while ensuring the buyer receives the agreed renewable energy benefits.

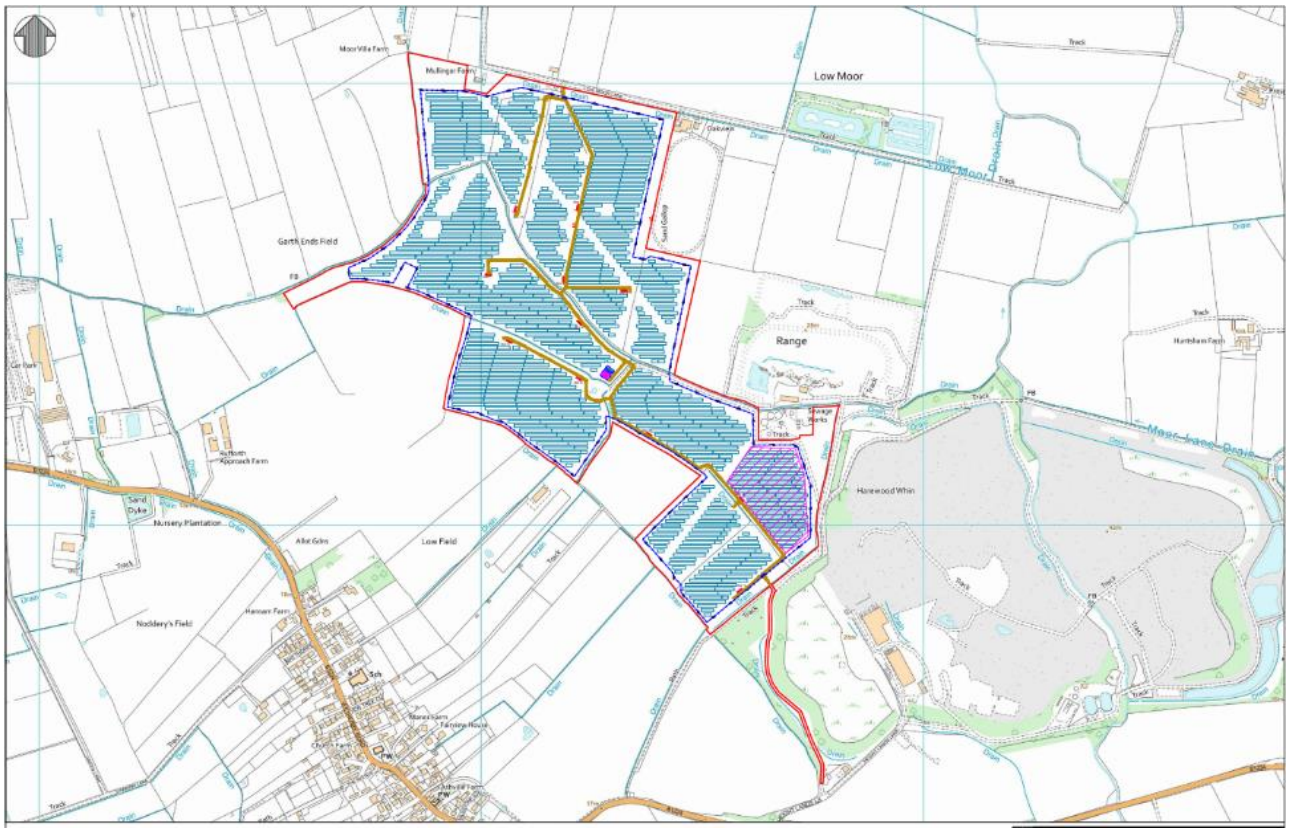
The PPA defines all of the commercial terms for the sale of electricity between the two parties, including when the project will begin commercial operation, schedule for delivery of electricity, penalties for under delivery, payment terms, and termination.

An important aspect of the sustainability of a PPA is whether it is increasing the amount of renewable generation in the UK, called "Additionality". New renewable generation PPAs are considered as additional to the current generation, directly contributing to the increase of renewable generation on the grid.

3 Adjacent Solar Development: Solar2

Solar2 limited applied for planning permission for a 50MW solar farm in March 2023 directly adjacent to Harewood Whin. The application was approved in September 2024, despite negative responses from local Parish councils and residents due to visual impact and use of farmland. The development has received planning application approval and a grid connection offer (approximately 40MW). The developers have also been successful in Feed in Tariff Contract for Difference (CfD) auction and received support for 32 MW at a strike price of £50.07/MW which was outlined is around £74/MW in today's prices as the strike price is based on 2012 prices. Due to constraints, the site is potentially able to deliver less output than the grid capacity that has been awarded. The developers have outlined that they plan to have the solar farm connected to the grid by August 2026.

Figure 7: Solar2 Planning Application development at Hessay, adjoining Harewood Whin



The connection for Solar2 has two proposed connection routes, one passing through the Harewood Whin site via a 33kV connection to the substation in Poppleton or one avoiding Harewood Whin with a connection route along the A59 to the north of the site to Poppleton. Following consultation with Solar2 during this baselining stage it was confirmed that the route will not cross the Harewood Whin site.

Tinker Lane, which runs through the Harewood Whin site is a likely access road for the Solar2 site during build and operation. This could cause minor access issues if the construction of both sites overlap as both would need to make use of Height Lands Lane, although it is a two-lane road which would allow two normal size vehicles to pass safely.

The CYC legal report indicates that there is a covenant on Tinker Lane whereby vehicle weight and frequency restrictions on the private right of way could impact Solar2 construction access. This matter is ongoing with the CYC legal team.

There are few key risks and opportunities that the Solar2 development poses for Harewood Whin GEP.

The main risk is that Solar2 has taken the substation generation capacity which would otherwise be used by Harewood Whin so network reinforcement will be required to connect both solar farms to the grid. As it is being developed by commercial developers they are able to move the project on quickly from stage to stage

As the grid connection offer is higher than Solar2 is able to generate with current plans, a potential **opportunity** exists to utilise this capacity for Harewood Whin. There are three potential options where this can be undertaken:

- Solar2 develops additional solar capacity on Harewood Whin land and pays rental agreement for use of the space. Solar2 outlined that they would have no theoretical objection developing on a landfill site as opposed to a less complex greenfield site, if there was a commercial return.
- CYC develops a solar array on Harewood Whin land and uses the additional connection available to Solar2 and supplies Solar2 with additional power to export to the grid
- An IDNO is used by both parties and supports the development of the grid connection

Solar2 is currently in the process of ensuring it meets grid connection milestones – which should be confirmed by March. At this stage further consultation will be undertaken with the developers to explore these export options.

4 Yorwaste Renewable Feasibility Study Overview

4.1 Feasibility Report Overview

In 2022, Yorwaste sought to invest in zero carbon and renewable energy solutions to optimise economic and environmental benefits from the available space resource at their landfill site at Harewood Whin. The information presented in this section is based on the report findings and has not been tested.

A number of opportunities were assessed, including:

- Existing on-site loads consuming the renewable generation instead of energy purchased via the electricity distribution/transmission network;
- The creation of new products/services utilising the on-site renewable generation, including the possibility of Electric Vehicle (EV) charging; energy storage applications; and green hydrogen production and utilisation; and
- Sale of the on-site renewable generation over the grid to other Yorwaste sites and/or other clients via "sleeving" Power Purchase Agreements (PPA); or to adjacent sites via a Private Wire Agreement (PWA).

The data gathered included site energy consumption data, grid connection and electricity supply arrangements, local electricity distribution network capacity and network constraints, and an understanding of the landfill sites, their boundaries and local areas.

Further data was acquired during the course of the study including energy and vehicle fuelling requirements of Yorwaste, City of York Council (CYC) and North Yorkshire County Council (NYCC). This extended to consideration of other possible users of energy and fuel, for example at Harewood Whin for Pullman Coaches and the Poppleton Park and Ride (PP&R) scheme.

An overview of the options analysis is provided in the Table below.

Table 4: Summary of opportunities at Harewood Whin

Technology	Description	Cost	Carbon saving
Solar	**28MW Solar** Report outlined that up to 28MW of solar PV capacity could be delivered. A smaller scale array could meet the existing on-site demand or any additional on-site demand from new technologies installed such as EV charging, hydrogen electrolysers, or battery storage.	The estimated capital cost of delivering 28MW of solar PV is between £17m and £25m.	A standalone 28MW solar array could generate up to 28.7GWhs of electricity per annum and result in 5,947 tCO_2e savings per annum.
Wind	**4MW Wind** A high-level assessment was undertaken to determine suitability for wind generation, concluding that 4MW could be installed. Due to longer planning requirements and low likelihood of securing planning approval, wind is only considered as part of a future phase of development.	The estimated capital cost of delivering 4MW of onshore wind is between £4m - £6m.	4MW wind could generate up to 10.51GWhs of electricity and result in 2,178 tCO_2e savings per annum.
Green Hydrogen	**6MW Hydrogen and 5,060kg Storage**	The cost required to develop a	Saving associated with renewable

Technology	Description	Cost	Carbon saving
	The green hydrogen production facility could operate based on Proton Exchange Membrane (PEM) technology with a predicted capacity to supply up to 345,525kg of hydrogen per year. A 6MW hydrogen electrolyser installation would require 23,230 MWh of electricity to operate which could be met by the electricity output from on-site solar PV and/or wind turbines. The hydrogen that is produced could be used to provide fuelling for CYC vehicles or third party offtakers.	6MW hydrogen refuelling station is estimated to be £6m - £7m.	production of 23,230 MWh.
Battery storage	The proposed solution would be charged from the onsite generation to be released at a later time, when generation is less than demand. This would help to increase the site's own consumption and generate significant savings on electricity costs rather than earning revenue from exporting to the grid at lower rates.	The assessment into cost and carbon requires further information, such as capacity, energy demand on site and potential over-generation.	
EV Charging infrastructure	The feasibility study identified that there may be an opportunity to create a new "Park & Charge" facility in the front field of the Harewood Whin site. Such a site could be developed as a joint EV and hydrogen refuelling station, with the addition of piped hydrogen from Harewood Whin.	The assessment into cost and carbon requires detail on the facility type, for example the fees associated with a park and charge and the source of this electricity.	
Council depot location	. The opportunity to relocate the council's depot from Hazel Court to Harewood Whin was also considered as part of the long-list of options.	Cost saving to be determined.	Considered fuel and carbon savings
Council depot EV charging	By transforming fleet to EV, renewable generation could then be used to fuel these vehicles at the Harewood whin site. However, the Harewood Whin site would not be considered appropriate for an electrified fleet of vehicles belonging to the council or Yorwaste. This is because fleet vehicles are used during the day, when solar energy is created. The demand generation profile would not be beneficial for this solution.	It is estimated that fuel costs could fall by ~80% if fuelled by renewable electricity generated on-site.	Not considered feasible.

4.1.1 Phasing of Options

The conclusions of the feasibility study at the time of reporting are as follows:

- Installing the maximum PV solar system of 28MW provides an Internal Rate of Return (IRR) of 5.0%, so is considered a feasible option;
- Adding 4MW of wind generation increases IRR to 7.6% and is therefore financially appropriate to pursue;
- Adding battery storage to a 28MW solar array reduces IRR and therefore currently does not appear to be an advantageous application;

- Targeted Hydrogen (H_2) production delivering vehicle fuel produces an IRR of 7.7%;
- Supplying a possible Private Wire scheme and H_2 production produces an IRR of 8.1%;
- Adding 4MW wind generation to the above produces and IRR of 8.9%.

Due to longer planning timescales for wind or lower likelihood of planning approval, installing solar PV initially was seen as beneficial due to stand-alone positive IRRs. Successively larger schemes of solar PV for export only will reduce IRR.

A phased approach to implementation of technologies on site was recommended, up to an “end game” scenario where a full 28MW solar array, 4MW of wind and up to 6MW of Hydrogen and 5060kg of Storage.

To meet on site consumption demand on site, Phase 1 recommended two 0.65MWp PV systems, which would supply >50% of all Yorwaste’s electricity consumption. The initial 2x0.65MW scheme is intended to connect 2 separate MPANs at a low voltage connection to the grid. This was considered above a 28MW PV scheme which will require connection at higher voltage and will require additional network reinforcement and configuration.

Phase 2a of the plan recommended the implementation of Hydrogen and Storage technologies on site, alongside the move of the Refuse Collection Vehicle (RCV) depot from its current location at Hazel Court. This move would have to coincide with the upgrade of RCV fleet to EV.

A summary of the feasibility report options appraisal is provided below which outlines the key scenarios the site could implement, establishing the capital costs for technology solutions identified as well as integration and operational costs as necessary. Output efficiencies and component replacements were considered across a presumed 25-year operational life to determine costs. The report provided costs for the options, which included grid reinforcement at the time of the report.

Table 5: Feasibility options appraisal shortlist

Option	Capex	Import average MWh pa	Export Average MWh pa	Average tonnes CO_2e saved pa	Scheme IRR*
S1. 28MW solar	£32,771,264	5	28,669	6,625	5.0%
S2. 28MW solar, 4MW wind	£37,200,594	14	42,941	9,921	7.6%
S3. 28MW solar, battery storage	£34,257,601	12	27,787	6,600	4.9%
S12. 28MW solar, 6MW Hydrogen	£47,450,865	5,925	11,121	5,406	7.7%
S15. 28MW solar, 6MW Hydrogen, Private Wire	£47,473,195	6,294	10,179	5,356	8.1%
S20. 28MW solar, 4MW wind, 6MW Hydrogen, Private Wire	£52,092,432	942	16,425	8,510	8.9%

** These results are directly sourced from the feasibility study and have not been tested. Relevant further analysis will be undertaken during the options development study.*

The report outcomes were as follows:

- Installation is proposed to be rolled out in stages, firstly to meet onsite load of Yorwaste;
- Adding battery storage reduces IRR and therefore currently does not appear to be an advantageous;
- A secured market and volume opportunity for hydrogen use is required before determining the optimum hydrogen production requirement;
- The additional application of a private wire scheme increases returns.

The landfill site has undulating ground and in most areas is grown over with grasses and weeds. This would not provide any issues in terms of installing a large-scale solar PV array but may increase upfront costs of installation. The landfill will continue to settle over the next 20 years, which will be considered when designing the solar PV infrastructure.

For the larger installations if substantial amounts of electricity are to be exported, this would require some major infrastructure work by the district network operator Northern Power Grid.

4.2 Inclusion of Fleet EV charging

The feasibility assessment considered EV charging points on the Harewood Whin site for an electrified fleet of vehicles belonging to either Yorwaste or Local Authorities. However, it was deemed not to be suitable as such vehicles will be utilised during the day and not generally available for charging from a PV array, without the use of an energy storage device.

It was considered there would be opportunity of establishing a private wire 11kV network from Harewood Whin to the Poppleton Park and Ride (PP&R) site, that has been established by CYC as an EV charging “HyperHub”.

4.3 Battery storage

Energy storage is recognised as a key technology required to support the transition to a low carbon energy system, maintaining grid stability as intermittent renewables become widespread. The feasibility report included the modelling of battery storage with solar, however this reduced the IRR and currently doesn’t look to be advantageous. Options for battery storage should be reviewed as technology advances.

4.4 Additional opportunities

The feasibility report outlined that given that Harewood Whin already has landfill gas generators on-site and these have a finite operational and/or commercial life, there may be some opportunity to sell hydrogen as a fuel to these generators. Currently, the landfill gas produced onsite is sold to two third parties who use this gas as fuel to generate electricity using generators located on the south of site. The third parties supply some energy to the site, and the rest of the generated electricity is sold to the grid. The installed engine capacity is 0.7MW, and the average export to the grid is 190kWh of a total 225kWh produced by the generators. The generators hold a grid connection with a 1MW export capacity, and 30kW import capacity.

4.5 Grid constraints

G99 applications are processed in the order in which they are accepted by the DNO. Securing schemes early can therefore have a material effect on the ultimate costs of the proposed phases.

Over the period of developing the feasibility study, it is understood that Northern Powergrid had made five offers for generation connection to the Poppleton Substation, which would increase the price of Private Wire and grid connection schemes at Harewood Whin.

5 Yorwaste Planning and Environmental Baseline

5.1 Recent Planning History

In May 2023, a pre-application enquiry was submitted for a 28MW ground mounted solar PV system by Yorwaste at Harewood Whin. Pre-application advice was received in highlighting potential challenges with the site being located in the green belt and impacts to the visual landscape, ecology, local transport and flood risk.

Following this, a planning application, reference 23/01732/FULM, was submitted in September 2023. The planning application included an assessment of following environmental aspects:

- Heritage Statement
- Flood Risk and Drainage Strategy
- Transport Statement
- Landscape and Visual Impact Assessment
- Ecological Impact Assessment
- Biodiversity Net Gain (BNG) Assessment
- Glint and Glare Assessment
- Arboricultural Assessment

Whilst the heritage, flood risk, and arboriculture assessments did not identify any potential concerns, the biodiversity (ecology and BNG), transport, glint and glare and landscape and visual impact assessments did identify potential issues. These are summarised in the following sections. A summary of the Planning Statement is also provided.

5.1.1 Planning Statement

A Planning Statement was submitted to support the planning application for the proposed 28MW ground mounted Solar Development, including associated substation and infrastructure. The development could provide power for approximately 11,000 homes and would provide an annual carbon saving of approximately 6,000 tonnes per annum. The development comprises a series of PV arrays, cabling, necessary access roads, security fencing and associated substation buildings. Upon installation, the energy created is proposed to be fed into the grid. The development was proposed to comprise approximately 1,599 PV panels, positioned in a way that reduced the view of the panels from the surrounding area.

The development was proposed with a minimum term of 40 years, following which it would be decommissioned, and land would be restored, therefore effects on the landscape are not permanent. A 10% biodiversity net gain is also to be provided as part of the development to support the application.

5.1.2 Strategic Planning Implications - Green Belt

York currently does not have defined Green Belt (GB) boundaries, however these will be set following adoption of the upcoming Local Plan (LP). The LP will likely be adopted in Q2 2025 flowing an inspector's report and subsequent confirmation of the exact location of GB boundaries.

It is expected that GB boundaries surrounding Harewood Whin will be in line with those proposed below. The green area defines the GB with the red star locating Harewood Whin waste and recycling centre. All of the Harewood Whin area is within the Green Belt with boundaries up to Rufforth Village (which excluded from the GB).

Figure 8 Harewood Whin Green Belt

Any future use or development of Harewood Whin would need to comply with GB policy. The National Planning Policy Framework (NPPF) identifies that most development in the GB is inappropriate except for certain circumstances (as found in para.154 of the NPPF). Development in the Green Belt should therefore be refused unless very special circumstances can be shown – these are unique and exceptional conditions which would justify contravening GB policy. Harewood Whin planning applications would be considered against the NPPF.

There is potentially another option to reconsider the GB boundaries at the Harewood Whin site through a Local Plan review. This could propose 'Grey Belt' areas, where land has been previously developed and/or does not strongly contribute to GB and/or show where there is evidence and a justified need to release land from the GB, to meet an identified development need.

The NPPF (para.148) suggests that where it's necessary to release GB for development, plans should prioritise previously developed land first, grey belt second and finally other GB locations. It also requires that sites are, or can be made, sustainable particularly in relation to transport. The NPPF identifies that previously developed land does not include land that has been developed for waste disposal by landfill where provision for restoration has been made though a planning application.

In short, GB land can be released in exceptional circumstances via a LP review where a need has been identified which cannot be addressed elsewhere. Any development at Harewood Whin should be able to show that it has considered other options before releasing GB, which should be considered in a sequential way starting with previously developed land (PDL) in the GB, then non PDL in the GB and finally other GB locations.

5.1.3 Biodiversity

The Ecological Appraisal was undertaken to build an understanding of the current ecological condition of the site. In general, the Ecological Appraisal foresaw it is anticipated that "proposals may proceed while minimising significant adverse effect on notable species and/or habitats". No signs of great crested newts, otters, reptiles, water voles or white clawed crayfish or other national priority species were found except for badgers, which are believed to commute through the site but not have setts present, and bats. To mitigate

risks to bat habitats its suggested that any lighting that is subsequently proposed should be below 1 lux 5 from the light source and below 2 meters in height, with warm light low UV LEDs used with cowls.

The Breeding Bird Survey identified multiple species of national priority breeding birds within the site, namely bullfinches, dunnocks, grasshopper warblers, linnets, grey partridge, reed buntings, skylarks and song thrushes, making the site “likely to be of parish value and possibly up to district value”. Impacts on these species can be mitigated by installation of bird boxes, however it could be a major obstacle for installing wind turbines which have a higher impact on birds than Solar PV.

In terms of habitats present on the site, it was found to be a mosaic of open habitats, depending on how recently they were restored from being landfill, with most habitats currently of low ecological value. It was suggested to retain wildflower grasslands, ponds, scrub and woodland areas where possible and replace any removed trees at a 2:1 ratio.

Figure 9: Site habitat map

The Biodiversity Net Gain (BNG) assessment for the planning application outlines how the project can meet BNG legislation. It recommends wildflower planting and seasonal harrowing of the existing grasslands as they are currently lacking in diversity. Additionally, new native hedgerows are proposed to be planted around the perimeter of the solar panels. The grassland underneath the proposed solar panels wasn’t covered in the BNG because the impact of the panels is poorly understood, and the waterway wasn’t covered because the development was not proposed to come within 10m of its banks.

Figure 10: Site Biodiversity Net Gain plan

5.1.4 Transport

Currently, Yorwaste vehicles using the site have an agreement to avoid routing through Rufforth when accessing the A1(M) as the village has historically been limited from HGVs. The transport statement confirms this will also be asked of vehicles using the site during construction of the new solar farm. It's not predicted that the presence of the solar farm will impact traffic to the site once its constructed, however this limitation may be a factor if the site is used for York City Council's fleet.

5.1.5 Landscape and Visual

The submitted Landscape and Visual Impact Appraisal suggests that, despite the site being on raised land, the surrounding trees will limit visibility from the routes around the site, with only glimpses of the panels likely to be visible from most routes around the site, however this factor would likely change if wind turbines were installed.

Rufforth with Knapton Parish Council, Hessay Parish Council, along with 21 responses from local residents, are supportive of the Yorwaste application. Most support responses highlighted that the project is not visible from residential properties, didn't impact agricultural land, makes use of brownfield, and/or provides wildlife corridors.

However, this support is mainly framed against the Solar2 project, with many responses referring to Solar2 as "the alternative" proposal and the Parish Council's response suggesting that limited grid capacity makes them mutually exclusive. This is a misunderstanding of the planning process as one application has no impact on the other. Additionally, while the grid may not currently have capacity for both, uprating the existing infrastructure could be an option and grid capacity is outside the scope of local planning authorities so this wouldn't be a reason for rejection or approval regardless. The Solar2 project has received planning approval since these responses were submitted so there is a possibility residents may be less supportive if this project goes ahead as well as, rather than instead of, Solar2.

The main objection to the planning application comes from the two airfields near the site, Rufforth East and West. Both objected to the initial Glint and Glare Assessment as they weren't consulted for their specific requirements, with Rufforth East additionally stating that the impact of emergency landings, ground obstacles, and bird strikes hadn't been considered. In response to this a new technical note was submitted for each airfield in May 2024, which suggested there would only be a small amount of yellow level glare (i.e. glare that leaves a temporary after-image) visible when flying to or from either airfield and only for a limited amount of time per year and in worse case conditions. Rufforth East objected for a second time in reply to the technical note.

Figure 11: Site plan with solar panel orientation revised to reduce glint and glare

Another glint and glare assessment was submitted in August 2024, which suggested a panel angle of 146.25° would eliminate yellow glint and glare completely. Rufforth West Airfield responded that they would support the proposal with the new angle, while Rufforth East Airfield objected a second time, as the modelling was performed at “ground level” while the site is significantly above ground level due to the capped landfill topography of the mounds.

Further discussions into early 2025 have resulted in an update from Yorwaste, who report that the planning application is likely to be updated to omit the eastmost section of the solar development (shown on the right side of Figure 10), as the airfield’s glint and glare concerns persist for that section. The section could then be developed later as a standalone planning application, whilst the revised planning application for the two other sections of solar are now able to be submitted without complaint from the airfield.

5.2 Environmental Background

5.2.1 Permits

Harewood Whin’s history as a landfill means that careful consideration of its environmental baseline is necessary in weighing up options for the future of the site. In the United Kingdom, closed landfill sites are subject to a range of regulations designed to minimise environmental and public health risks. Key aspects of the regulatory framework include the Environmental Protection Act 1990, which requires operators to manage pollution risks, including leachate and gas emissions, for closed landfill sites.

Other relevant regulations include the Landfill Directive (1999/31/EC), which covers waste acceptance criteria, landfill gas management, and post-closure monitoring; the Landfill (England and Wales) Regulations 2002, which set out the requirements for landfill operators regarding the closure, aftercare, and monitoring of landfill sites; and the Pollution Prevention and Control (PPC), which ensures that closed landfill sites are monitored for emissions, and for the integrity of waste containment systems. Yorwaste holds an environmental permit (Ref. EPR/BK0507IB/V006) for the management and operation of Harewood Whin in accordance with a management system that minimises risks of pollution. It includes provisions on management, finance, energy efficiency, efficient use of raw materials, and avoidance, recovery and disposal of wastes produced by the necessary onsite activities. Limits are placed on the site in terms of waste acceptance, leachate levels, emissions, odour, noise and vibration, pests, with each being monitored throughout the year to remain within permitted levels which are reported to the Environment Agency each January.

5.2.2 Ground Conditions

The geology of Harewood Whin has been reviewed by Arcadis using online information including the BGS geology viewer. There is no superficial aquifer beneath the site, with the superficial layer being made up of silty clay from the Alne Glaciolacustrine Formation. A principal bedrock aquifer underlies the site, consisting of sandstone from the Sherwood Sandstone Group.

From a review of historical planning documents related to the planning application for a solar farm on the site, a Phase II ground investigation was identified. The report, produced by Solmek in 2016 as part of planning application 16/00357/FULM for a proposed waste transfer and recovery station. Four boreholes and three groundwater and ground gas pipes were created onsite, encountering made ground, clay primarily. Groundwater was recorded in all boreholes at between 5.80m - 6.60m below ground level. Samples were tested for suite of contamination types, with no levels raised above commercial thresholds identified. One borehole detected chrysotile asbestos fibres, but the report concluded that Harewood Whin is unlikely to pose a risk to current and future site users based on the testing undertaken. A previous study by City of York Council in 2012 found that the site was not identified as contaminated land as defined by the relevant regulations.

A Gas Risk Mitigation Report has been identified on the planning portal, submitted as part of planning application 16/00357/FULM. Produced by Solmek in 2016, the report details four monitoring visits in 2016 to assess Harewood Whin (specifically limited to the footprint of the waste transfer station). The reported gas

screening values placed the site in Characteristic Situation 1, the lowest risk classification for ground gas, and recommended no special precautions in the design or construction of the waste transfer station.

5.2.3 Water and Flooding

A number of relevant water features have been identified onsite and in the surrounding area, including:

- Onsite: Watercourse known as The Foss or Foss Dike (a tributary of the River Ouse), surface water storage lagoons at the eastern end of the site, leachate ponds, and other small drains and ponds that exist across the site
- Offsite: Sewage works to the north of the site, other drainage from surrounding fields including Smawith Dike and Moor Lane Drain

A flood risk assessment submitted as part of planning application 23/01732/FULM in September 2023 has been reviewed. The assessment analyses the Environment Agency Flood Map for Planning which indicates that the majority of the Site is designated Flood Zone 1 and therefore at low risk of fluvial flooding. Land designated Flood Zone 1 is defined by the Environment Agency as 'land having a less than 1 in 1,000 annual probability flooding from river or sea'. The Foss and a section in the north of the site are designated as Flood Zone 3 and therefore considered to be at high risk of fluvial flooding. However, the report considers that the mapping is inconsistent with the current day capped landfill topography, stating that with updated topography data, the entire site is within Flood Zone 1.

Surface water flood risk was also explored, with the report identifying areas from low to high risk across the site. The same issue was encountered here, with EA mapping not corresponding to the current day capped mounds. The report reviewed site topography and indicated that, with the exception of a high risk section at the north western site boundary and a low risk zone to the east, the EA mapping was consistent with current day topography.

Arcadis also reviewed the most up to date government flood risk mapping online, finding that the majority of the site is not at risk of flooding from surface water. The mapped surface water flood risk displayed in Figure 12.

Figure 12: UK Government flood risk mapping of the site[1]

[1] taken from https://check-long-term-flood-risk.service.gov.uk/

As part of the proposed solar development, the report recommended a Sustainable Urban Drainage System (SUDS) be developed onsite, ensuring that site surface water would be discharged to the existing field drainage system off-site at current greenfield rates, and that water treatment would be used to mitigate risk of off-Site pollutant migration.

In Arcadis' engagement with site operatives, surface water flooding has been raised as an issue impacting the site, and as such, further investigation into flood risk to any options considered for development onsite will be necessary as part of the planning process.

5.2.4 Other Environmental Considerations

The site is subject to monitoring and reporting of a number of factors, and as such an accurate baseline for activities onsite is able from Yorwaste. Initial online searches have identified documents, including an environmental statement, submitted as part of planning application 16/00357/FULM ("for the construction of a waste transfer station with associated ancillary buildings, hard-standings, car parking and alterations to access"), submitted in February 2016, that has been used to inform the environmental baseline for the site.

These sources highlight that several sources of odour have been identified in the vicinity of Harewood Whin; these include the capped landfill, the waste transfer station, the unmanned sewage treatment works to the north of the site, agricultural activities on surrounding land, and a small waste transfer station located on Rufforth airfield, south of the site. In the past, landfilling operations at Harewood Whin have received odour complaints from residents of Rufforth, Acomb, Knapton and Chapel Fields, with investigations attributing the odour to the waste landfill operations and fugitive emissions of landfill gas.

Noise sources impacting the surrounding area of the site include road traffic, aircraft, agricultural activities and wildlife. Onsite activities are reportedly audible at some of the nearby properties, however the site complies with noise limits at all specified locations monitored.

The site sits within the York green belt, surrounded by primarily agricultural land. No features of designated nature conservation interest were identified onsite. However, there are four statutory designated sites of nature conservation interest within 5km of the site and a further three non-statutory designated sites within 2km. Harewood Whin is covered by a mixture of capped landfill, buildings and hardstanding, and areas of grassland with occasional trees. The Environmental Statement identified two semi-mature plantation woodland blocks within the site, and the site boundary is covered with trees and hedgerow (perimeter screen bunds) to shield the site from view, with especially dense woodland alongside the southern boundary of the site, bordering the B1224.

A previous Preliminary Unexploded Ordnance risk assessment carried out in 2012 found that Harewood Whin contained buildings related to RAF Rufforth during World War Two, with a bomb dump located south of the site on the airfield. However, the site was considered by the assessment to be in an area of low bombing density.

6 Energy Demand Offtakers

6.1 City of York Energy Offtaker

6.1.1 Electricity Demand

Installing renewable energy at HW offers the potential to serve CYC energy demand (either directly or through the electricity network) and support decarbonisation towards the City's target to be net zero by 2030 (CYC Climate Change Strategy 2022-2032). This section outlines the current CYC's energy demand and procurement process. CYC's operations are spread across the York area, with the assets with the highest demand outlined below:

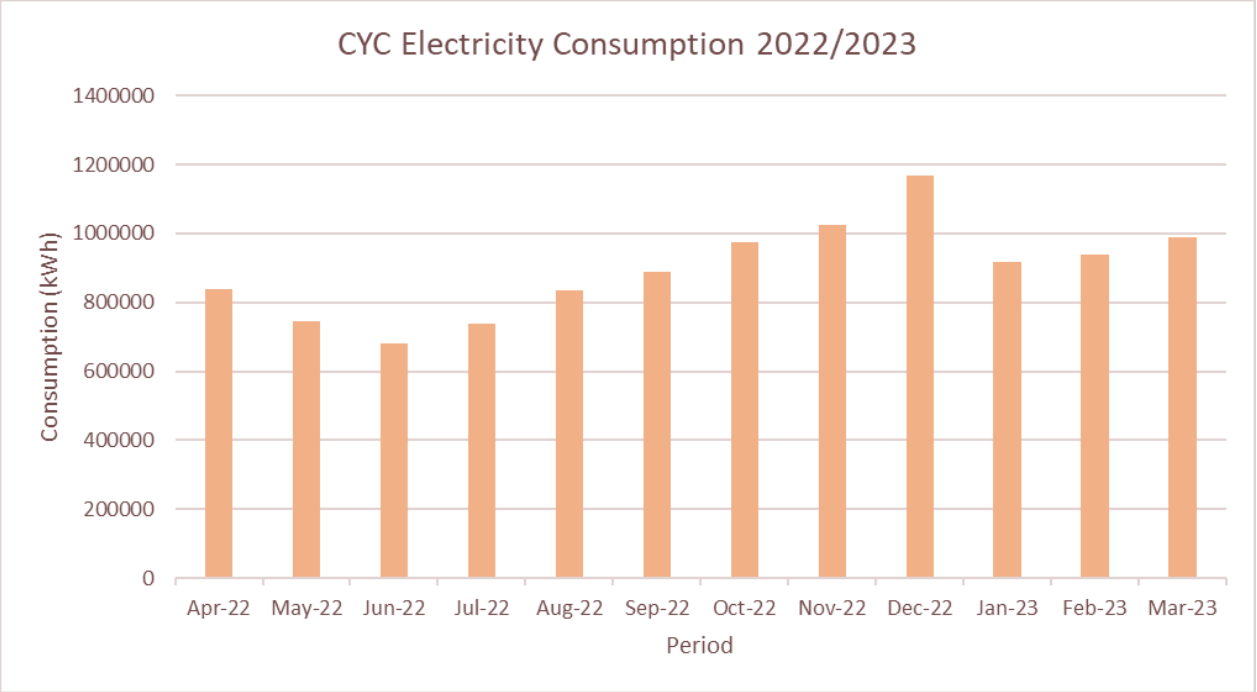
Table 6: Annual electricity and gas consumption for CYC 2022-2023

Location	Annual Electricity consumption (kWh) (22/23)	Annual Gas consumption (kWh) (22/23)
West Offices	1,552,092	1,414,789
Hazel Court	414,701	396,929
Amy Johnson Way	217,413	No gas
Crematorium	119,026	923,163
Total (Including other assets)	**10,344,485**	**10,052,383**

The costs associated with this consumption in 2022/2023 were £3.6m for electricity, and £1.37m for gas; a total of £5,017,737. Both electricity and gas consumption are expected to increase slightly for the year 2023/2024. CYC purchases energy through a YPO/nPower framework as detailed in Section 6.1.2.

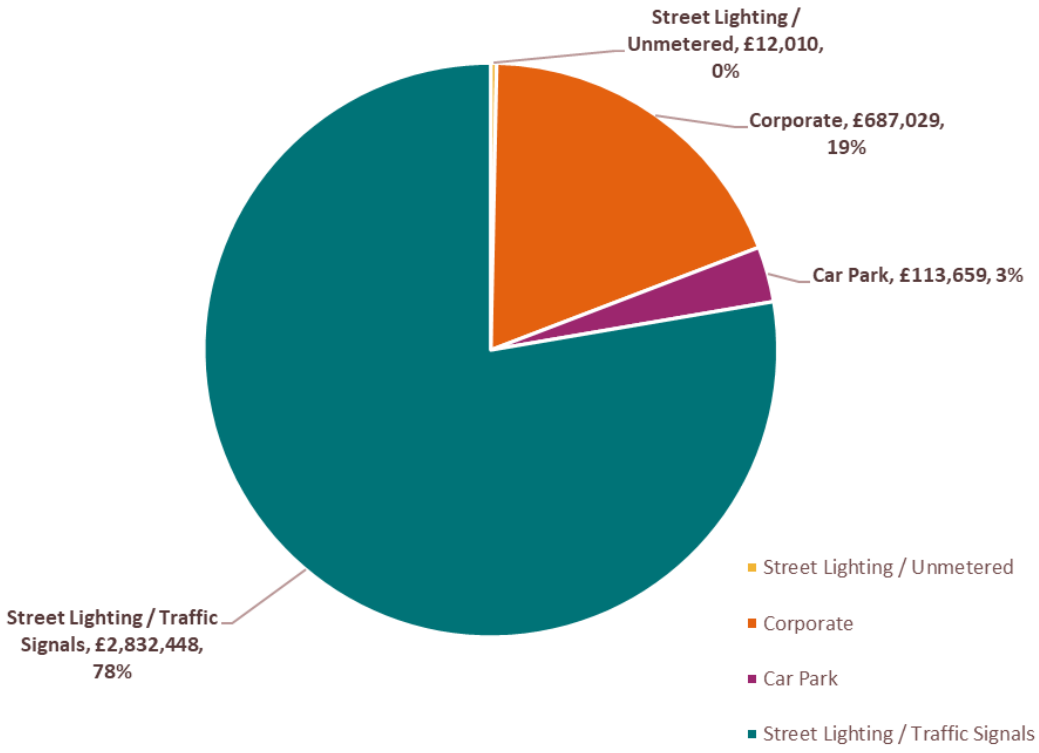
For data taken from 2022/2023, seasonal variation in electricity demand is between ~680,000 kWh in June and ~1,160,000 kWh in December. This is roughly a 40% increase in demand in December. Variation across the period is shown in Figure 13.

Figure 13: CYC Electricity consumption 2022/23



The electricity demand and, therefore, costs are made up of different service areas (corporate, street lighting, car parking, traffic signals) with separate contracts and prices paid. The breakdown of costs for the period 22/23 is shown in Figure 14.

Figure 14: CYC Annual Electricity Costs 2022/23



Energy prices have been volatile due to geopolitical instability surrounding the Ukraine war, COVID, and more, and so a future move away from gas to electrified heating powered by a green energy park could provide savings, resilience and contribute to the decarbonisation goals of the council.

6.1.2 CYC Electricity Procurement - YPO and nPower

The Yorkshire Purchasing Organisation (YPO) is a publicly owned central purchasing body that facilitates electricity consumption framework tariffs for a group of customers in the region. CYC is currently supplied electricity through a YPO framework (Electricity and Ancillary Services – 1100) supplied by nPower. The YPO/nPower framework supplies electricity to a basket of like-minded public sector organisations totalling 496m kWh/yr. The framework runs from 1st April 2023-31st March 2027 with 2x24 month extension options available after this date.

Current electricity consumption rates are 8.81p/kWh for 2025-2026 (commodity charge) with up to 100% of the rate fixed for the year to keep costs and forecasts constant for CYC. Current non-commodity charges are 13.76p/kWh (2025-2026) and Renewable Energy Guarantees of Origin (REGO) charges are 1.25p/kWh, ensuring 40% of CYC electricity is derived from green generation.

Options are available through the YPO/nPower framework to offset CYC current electricity consumption with potential CYC green electricity generation at Harewood Whin or to other offtakers via Purchase Power Agreements (PPA's).

6.1.3 CYC Fleet

One of the options to be explored is the potential to use renewable electricity generated by the energy park to charge electric vehicles that use the site. This could include waste vehicles, third party offtakers, and the CYC fleet.

The CYC fleet is currently stationed at Hazel Court in York, which the council owns and uses as a depot and office space for their operations. Hazel Court is reportedly at capacity for vehicle storage and charging infrastructure, necessitating a new depot in future, with the council is exploring options for future depot space, anticipating an increase in fleet size as council services expand with housing growth. The council fleet is currently in the process of being partially switched to electric vehicles in support of achieving carbon neutrality by 2030, with the smaller (<3.5 tonnes) vehicles being transitioned, and the larger vehicles in the fleet up for renewal in 2027 when a decision will be made on electrification of the HGVs.

Hazel Court contains an eight-bay workshop, a Jewson, offices, parking space and EV charging infrastructure, with the waste fleet, building services, highways fleet and more council vehicles operating out of it. Up to 350 onsite staff, and 18 contractors operate from the depot daily. Hazel Court's electricity costs were £150,926 in 2023/24, including the charging of EVs onsite, with this cost likely to increase as the council transitions to a higher proportion of EVs. The site is located 6.5km to the east of Harewood Whin, with vehicles stationed there being used for the council's operations in waste, maintenance, personnel transport and more. The potential to move some or all of the council's growing EV fleet to Harewood Whin would alleviate pressure on Hazel Court and allow room to expand the fleet in the coming years.

The current CYC fleet consists of ~240 road vehicles, all owned by the council, undertaking ~3600 journeys and travelling 100,000 miles each month, with a schedule to invest in switching a portion of the fleet to EVs. Fleet data has been provided and lists 162 car/van/buses (<3.5 tonnes), and 66 HGVs (>3.5 tonnes) within the fleet, 34 of which are part of the waste fleet. Fleet management reported that 95% of <3.5 tonne vehicles will have transitioned to electric by the end of 2025, and that Hazel Court has the EV charging capacity to support this transition, with a 250kVA capacity onsite. EV infrastructure to serve the fleet of smaller vehicles at Hazel Court was installed in 2021, including 35 Pulse7 7kW chargers with two sockets each, and 10 UltraCharge 50kW chargers, with a total cost of £1.12 million. The council own and operate these chargers, however fleet management reported that the charger provider (currently BP pulse) is likely to change in 2025 via a retender. For the HGVs in the fleet, the transition is slower, with two EV HGVs currently used in the waste fleet and charged at Hazel Court, with mobile EV chargers for the EV HGVs used at Hazel Court. Staff have reported operational issues with the EV refuse collection vehicles, specifically with range and faults with the chargers. Cost and range are reportedly prohibitive factors for the total transition of HGVs to electric, and the council is waiting until 2027 to reassess, when a large proportion of the current ICE fleet is scheduled for renewal. The council report costs of £220,000 for new diesel waste vehicles, and £450,000 - 500,000 for EV

waste vehicles. Hydrogen vehicles are the most expensive option, with an estimated cost of £900,000 with the maintenance package included. Fleet management at Hazel Court reported a high-level approximate cost for transitioning the waste fleet of HGVs to EV before 2030 of ~£17.5 m for 34 waste HGVs, which are currently due to be replaced before 2030. 30 further HGVs outside of the waste fleet are due to be replaced in 2030 – 2033. Online sources including previous projects on the transition of council refuse collection vehicle fleets to electric or hydrogen estimate the cost of a new electric waste HGV to be £400,000 (the Dennis Eagle 'eCollect'), and the cost of a hydrogen waste HGV to be £620,000 – 850,000.

The council's waste operations are a mixture of refuse, garden waste, and recycling, with 200 employees spread across 30 waste crews. Collection is primarily domestic; however, two crews operate commercial collection. 33 waste HGVs make two trips daily to Harewood Whin, five days a week. These vehicles must tip before returning to Hazel Court due to fire risk restrictions. With the Hazel Court depot being at capacity, and fleet expansion expected in the coming years, a relocation of some, or all, of the waste fleet to Harewood Whin has been considered a number of times in the last decade. Engagement with fleet management identified issues with relocation including increased commuter distance, and the added travel time to Hazel Court workshops for maintenance, which is required every 6-7 weeks for waste HGVs.

In 2022/23 the council's fleet consumed 654,586 litres of diesel and petrol. It has previously been estimated that fuel costs could fall by as much as 80% if the fleet was powered by renewable electricity generated onsite, with other benefits including reduced journey's travelled, and operational savings. Currently (and historically during the use of Harewood Whin as a landfill), waste vehicles are prohibited from exiting the site onto the B1224 in the direction of Rufforth, to prevent negative impacts to the village. Impacts to local stakeholders will be considered when assessing the feasibility of moving vehicles to Harewood Whin.

6.1.4 Fleet Relocation: Hazel Court to Harewood Whin

It is understood that in anticipation of Hazel Court reaching capacity as a fleet depot, relocation of the CYC waste fleet and buses to Harewood Whin has been explored previously. Work was undertaken by City of York Council on the potential relocation of the council's waste fleet in 2020, producing a carbon and cost reduction plan report that initially proposed the idea, discussing the pros and cons of the relocation.
The report compared three options at a high level: a do nothing option, relocation of the fleet buses elsewhere, and relocation of the fleet and buses to Harewood Whin, with additional developments (other amenities and outcomes such as allotments, woodland, light industrial units and housing). The report was a bid for funding from the combined local enterprise partners, however it did not receive funding.

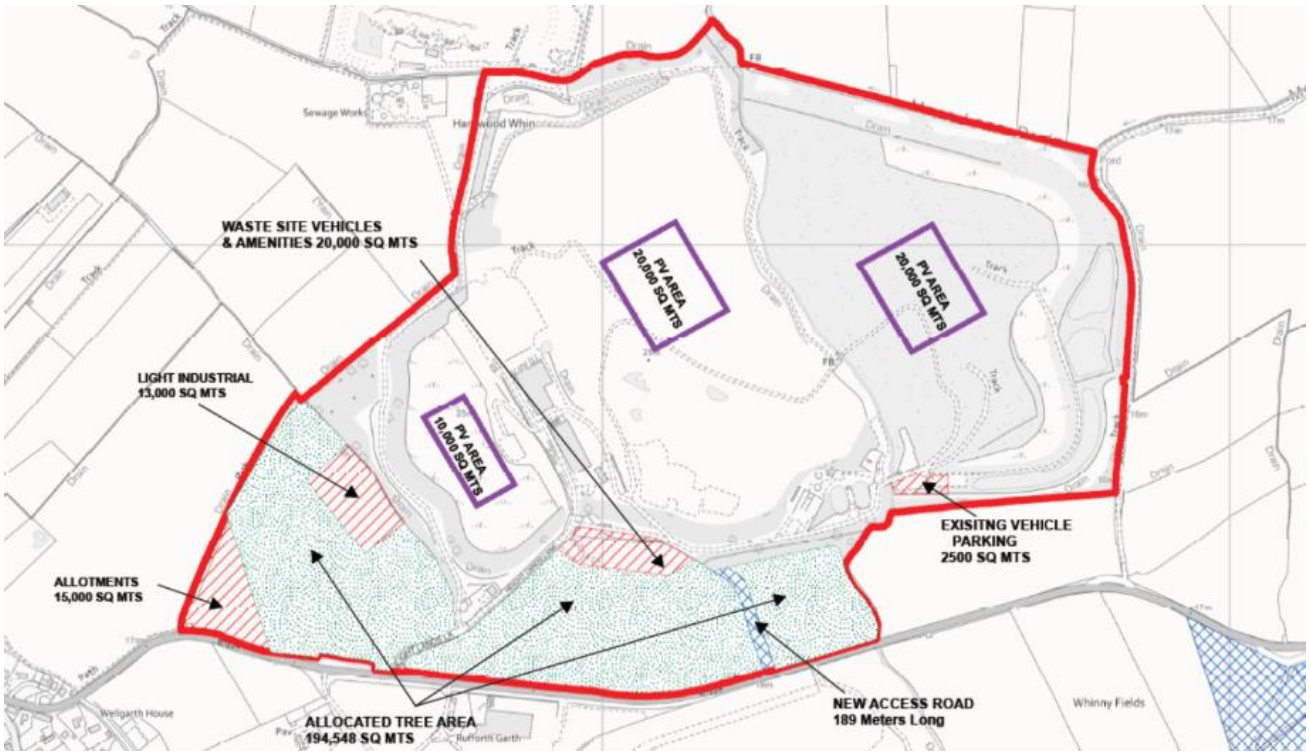
It is worth noting that the report is now outdated, estimating costs for a smaller fleet of council waste vehicles, and in the context of a less constrained grid. This means that the costs estimated are likely to have increased since 2020, but also the carbon savings. The report estimates that fewer miles would be travelled by the fleet if moved to Harewood Whin, resulting in carbon savings of 46 tonnes/yr and allowing for the opportunity to power the fleet via solar developed onsite. The report identified the largest risk as difficulty obtaining planning consent for a new depot at Harewood Whin, given that the site is situated within the green belt.

The report estimates the total capital cost of moving the fleet to be £19.2m, however this includes development of light industrial units, the purchase of more land for a depot and infrastructure, solar PV and other developments at Harewood Whin. Income from the proposed developments were estimated at £31m over 25 years, with more than half resulting from solar PV installed onsite selling electricity to the grid. Costs and payback were estimated for the project using values from the Energy Oasis feasibility study, and council Quantity Surveyor estimations. It was also recommended that the bus fleet serving the council (First Bus) be relocated to Harewood Whin, to free up land in York for residential development. The fleet has since been relocated to James St., and the previous depot at Hospital Fields Road redeveloped into homes.

Development of the depot at Harewood Whin was considered by the report to require the purchase of the fields to the south of Harewood Whin, and a new access road to alleviate the impact of increased traffic at the site. Since the report in 2020, the land allocated for use as allotments and trees has not been developed. The

hatched area shown below for light industrial units remains undeveloped, and is reportedly not the maximum area available for warehouse units, which could be powered by renewable energy generated onsite.

Figure 15: Plan showing the proposed areas allocated to different benefits, from the 2020 council report on fleet relocation.



6.2 Yorwaste Energy Offtaker

6.2.1 Yorwaste Electricity Demand

There are 4 Yorwaste MPAN locations on site, with a combined annual consumption of 962,670 kWh (2020/21). A previous feasibility study assessed the half hourly (HH) data for the site, showing high demand throughout the day between the hours of 7.30am and 7.30pm (peaking around 100kW per half hour). There are seasonal variations within this, with January showing the highest demand and July showing the lowest demand (peak of 55-60kW). Weekend demand is much lower, remaining around the baseload of 40kW throughout the day.

Table 7: Electricity demand on site (2020/2021)

Location	Annual consumption (kWh)	Maximum Demand (kW)
Amenity block	90,315	33.6
Leachate treatment	549,226	98.6
Cell 10	15,582	17.2
C&I Recycling	307,547	112.0
Total	**962,670**	**232.6**

Updated hourly data was provided for 2024 for three locations, totalling 684,490 kWh. The fourth location, Cell 10, was not included in the 2024 readings but represents a significantly lower percentage of the energy demand than the three sites analysed (2% in 20/21). Analysis on the three MPANs demand is presented below.

Table 8 Electricity demand on site (2024)

Location	Annual consumption (kWh)
Amenity block	73,300
Leachate treatment	298,152*
C&I Recycling	313,038
Total	**684,490**

**9 months actual, 3 months estimated*

The demand varies by weekday and weekend, with weekend demand lower except in the case of the leachate treatment process (see Figure 17, c). Baseload for all three locations sits around 50kW. Daylight hours, between 7am and 2pm, show a load of greater than 100kW. This is where solar may be able to provide the greatest site benefits.

Figure 16: Combined site location average electricity demand

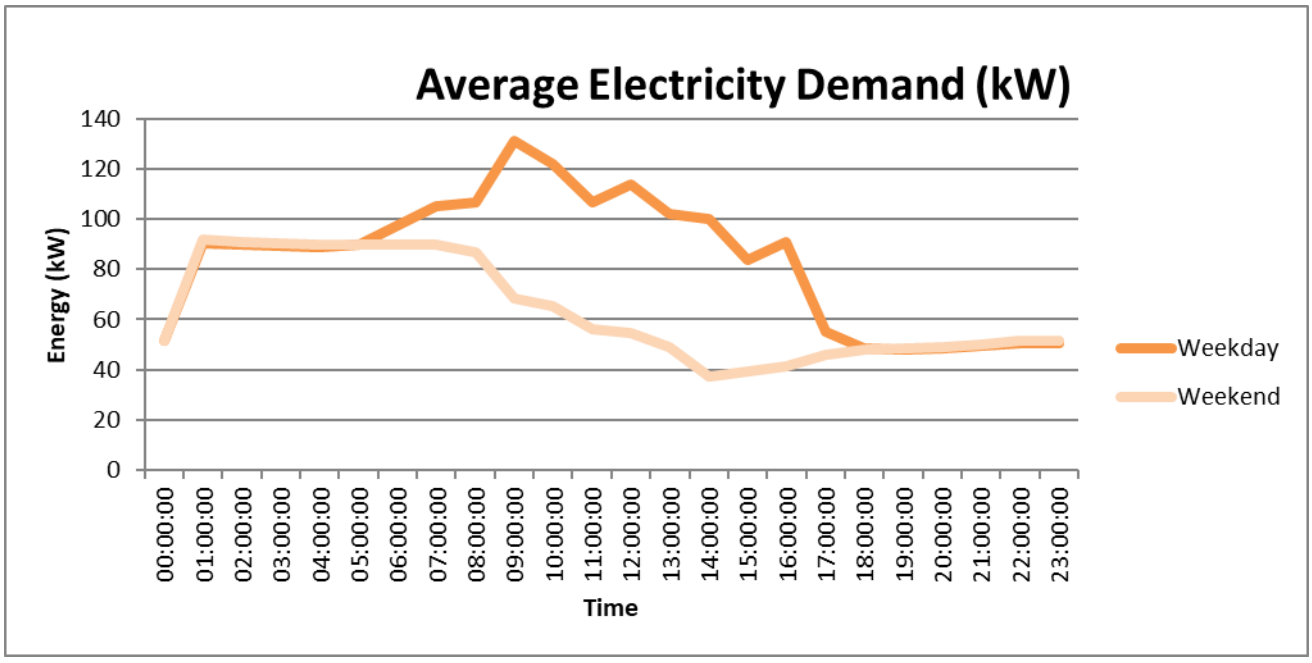
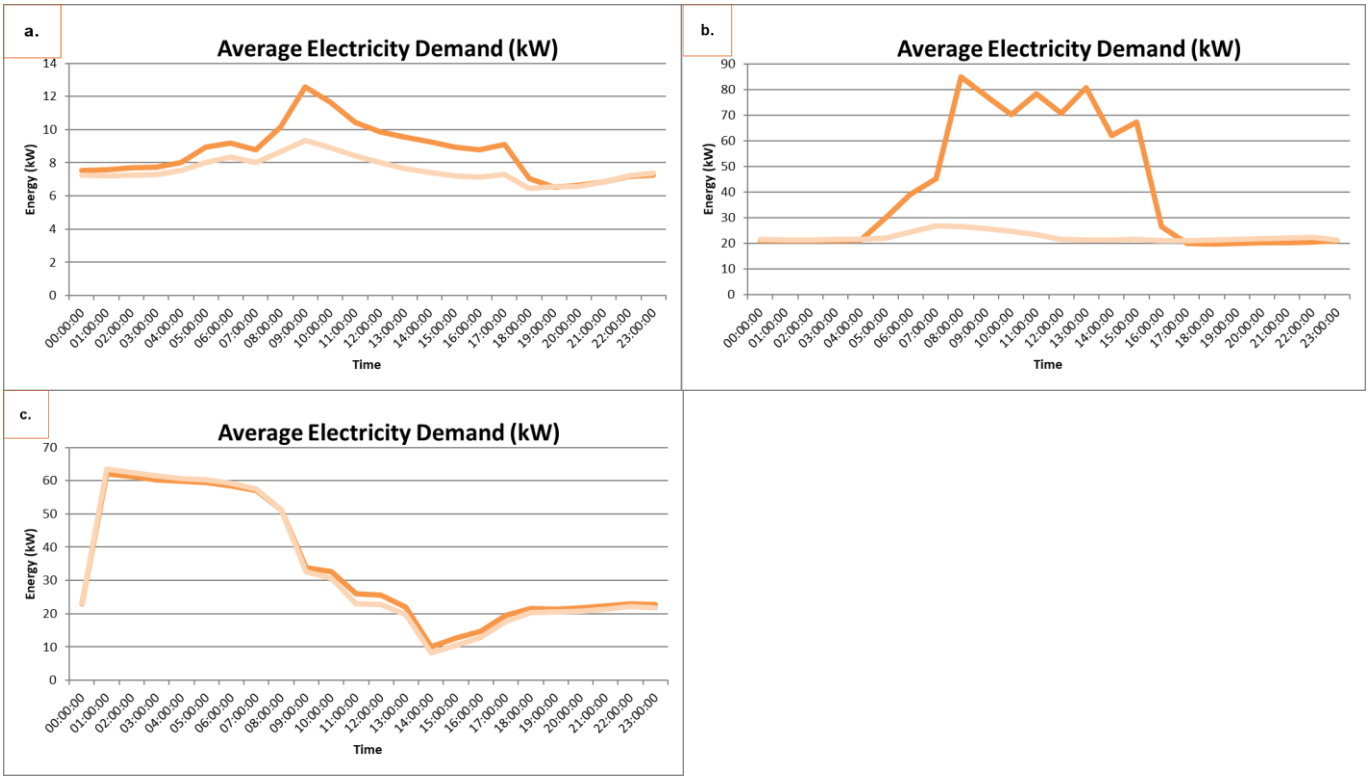
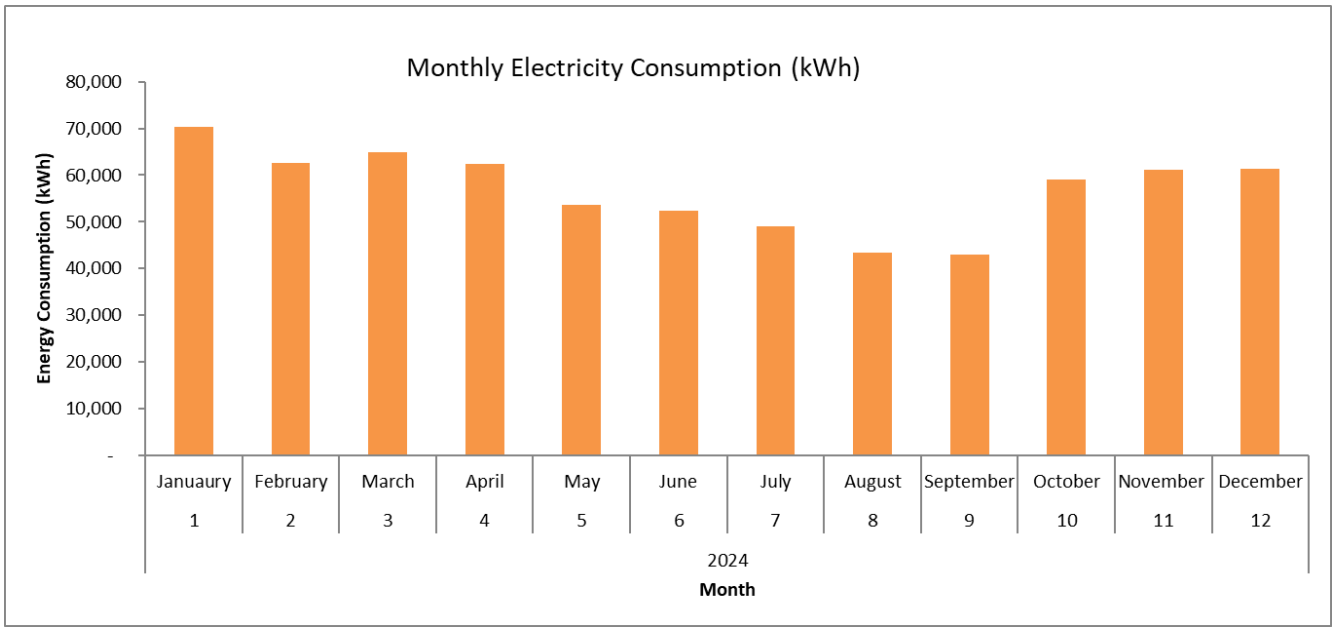


Figure 17 a) Amenity Block b) C&I Recycling and c) Leachate Treatment: Average Electricity demand



By looking at monthly demand, August (19,136kW) and September (17,086kW) have the lowest demand and March and October the highest (28,694kW).

Figure 18: Harewood Whin Monthly Electricity Consumption (2024)



Using the site energy demand, the feasibility study into the potential renewable energy sources at the Harewood Whin site indicated that a 428.5kWp system would provide 33.6% of the onsite demand with a payback of 6 years. A 1MW array was assessed to provide 50% of onsite demand, with a payback of 10 years and excess generation of 40% (export to the grid).

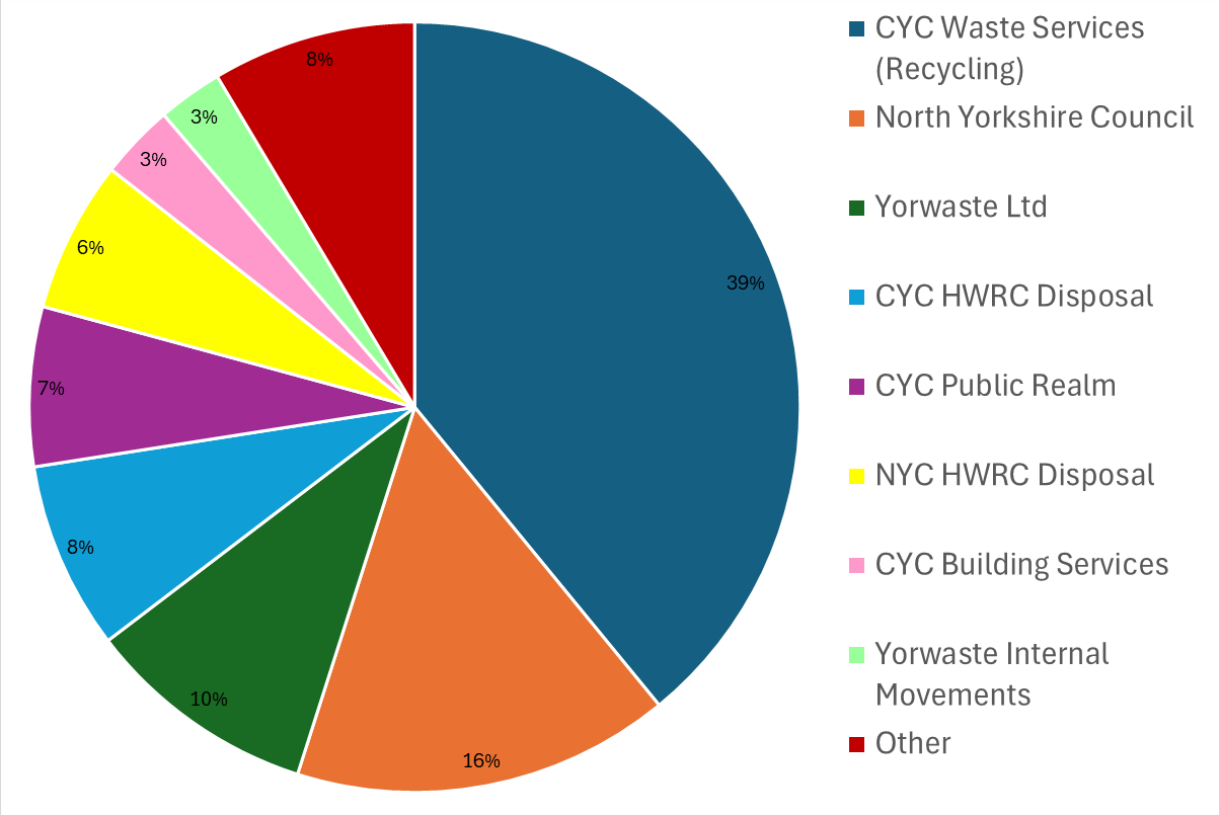
6.2.2 Other fleet information

A baseline is being established for other stakeholders that use the Harewood Whin site or operate in the local area, with the aim of exploring potential opportunities for offtakers from Harewood Whin for EV charging via PPA, or the storage of vehicles at a potential Harewood Whin depot.

Yorwaste operates a fleet of waste vehicles that make trips to Harewood Whin regularly. At present, Yorwaste has indicated that the company has no plans to decarbonise its fleet as part of the development of the GEP, and no plans to transition their HGV refuse fleet to EVs, despite the company having wider decarbonisation targets. Seventeen vehicles are currently stored onsite at Harewood Whin overnight, with more stored at several other sites, and are rotated between sites throughout their useful life. Yorwaste management stated that a partial transition to EVs would cause flexibility issues within the fleet, resulting in overall reduced capabilities. Fleet data provided shows that Yorwaste's fleet travels over 1,000,000 miles annually, including vehicles stored at Harewood Whin, Seamer, Tancred and Thirsk – corresponding to 1,543,934 $kgCO_2e$.

Yorwaste has provided weighbridge data on the vehicles that use the Harewood Whin site's waste transfer station. Over 45,000 trips to Harewood Whin are made annually, with analysis showing that CYC Waste Services are the most common user of the site, with 17,925 trips made to Harewood Whin and 39% of all trips. CYC fleets including Public Realm, Building Services and Household Waste Recycling Centre (HWRC) Disposal also use the site among the most often. NYCC and NYCC HWRC Disposal account for a combined 22% of trips to Harewood Whin. The 'Other' category is made up of companies that make less than 1000 trips to Harewood Whin per year, made up of 62 different entities, the greatest of which is Wetherby Skip Services Ltd at 523 trips.

Figure 19: Proportion of total trips (45,879) to Harewood Whin accounted for by different visitors in 2024



North Yorkshire Council (NYC) was formed in April 2023 and is a new unitary authority made up of eight previous councils. Selby District Council, now part of the NYC operates a fleet that using Harewood Whin as a waste transfer site. The fleet includes the route used for the previous services to Selby and may incorporate wider services under the auspices of the new unitary development.

Engagement with the team at NYC that used to deal with Selby District Council's waste management activities was undertaken was undertaken during the development of the baseline report. The consultation highlighted that the MYC waste fleet that uses Harwood Whin primarily operates on a four-day week, and uses Harewood Whin for tipping commercial waste, refuse, and green waste, with around 13 vehicles tipping twice a day at the site. These vehicles are primarily 26t refuse trucks and are not yet being transitioned to electric vehicles. The fleet currently resides at Prospect Way, and collects waste from a large but sparse area, meaning that ICE vehicles are still favoured for the operation. The potential to relocate a proportion of the NYC waste fleet to Harewood Whin has been discussed, and issues were raised in relation to impact on commuters, and increased round trip distances for the fleet.

6.3 First Bus - Energy Offtaker

First Bus operate the council's bus services and use a depot at James St. in York in close proximity to Hazel Court, as well as a recently acquired subsidiary coach depot (York Pullman) adjacent south of Harewood Whin.

The First Bus fleet in York is electrified, however the recently acquired York Pullman coach fleet still uses ICE. Their net zero goal is 2035. Discussions with First Bus on partnership and mutual benefit are ongoing in relation to supporting CYC fleet decarbonisation, sharing charging infrastructure, and the option of charging vehicles at Harewood Whin or the adjacent coach depot. First Bus operate 80 buses in York, stored at the James St. depot or the five park and ride depots. The fleet is entirely electric, with the company aiming for net zero by 2035. The company has a partnership with the council, operating the bus services in the city and supplying buses to the CYC P&R operation. All of the buses are stored and charged at James St., and legal difficulties have been reported when trying to develop EV charging infrastructure at the P&R sites. The James St. depot utilises ~40 150kW chargers, and charge the buses daily, taking up to 4 hours. The buses can travel 150-250 miles daily, and due to the low mileage of the operation, they are able to perform the same routes as historical ICE vehicles used.

First Bus also own a subsidiary, York Pullman Coaches, which operates out of a depot on Wetherby Road, just south of the Harewood Whin Site. First Bus reported that the York Pullman fleet is not yet electrified, with only one EV coach charged onsite: a Yutong TCe12 that can travel over 200 miles, and requires two hours to charge at the depot. For longer range journey profiles typical of a coach fleet, EVs are not yet feasible. The York Pullman depot is estimated to house 30-40 coaches with varied mileage, and may be able to store an extra 15 vehicles.

Discussions with First Bus have shown the potential for partnerships with CYC on the project, with CYC utilisation of First Bus depot space, charging infrastructure seen as options, and the York Pullman coach depot being open to discussions on offtaking renewable energy when it transitions to electric coaches.

7 Other Relevant Studies

7.1.1 York Local Area Energy Plan

The City of York Local Area Energy Plan (LAEP) aims to assist in identifying technologies and approaches that will help to achieve net zero in the most efficient manner. The Plan is produced as part of the York and North Yorkshire LAEPs and identifies the changes needed to the local energy system and built environment to ensure a coordinated approach is taken to the transition of energy systems across York and North Yorkshire.

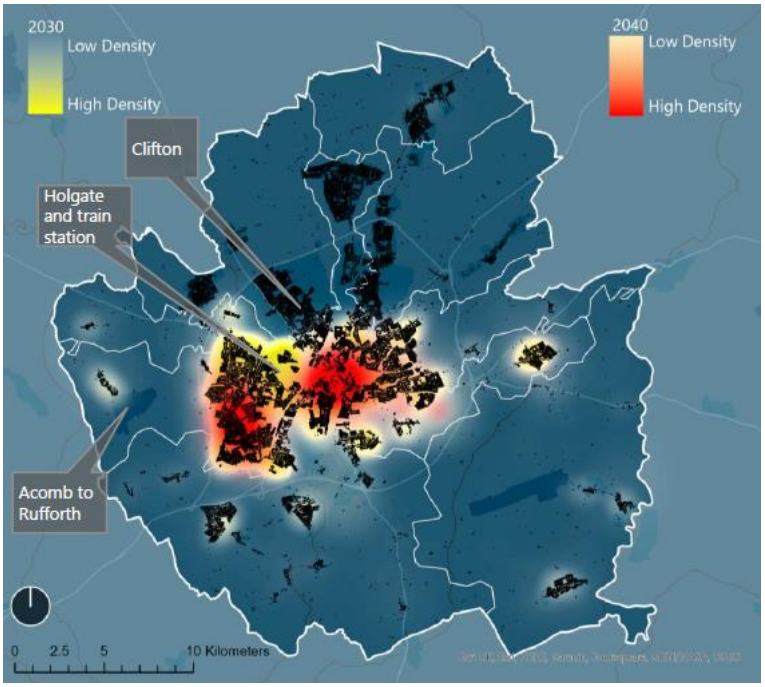
The LEAP for the City of York estimates that to reach a net zero energy system by 2040, capital investment of £3.8 billion will be required, including £0.5 billion in large scale renewable generation to provide 920MW of capacity.

Currently, 97% of electricity consumed comes from the National Grid. The Harewood Whin landfill gas generator provides a small amount of the energy mix.

Around 10% of vehicles registered within York are plug-in hybrid or pure electric. As EVs increase with changing legislation, phasing out petrol and diesel vehicles, steps will need to be taken to cater for vehicle users with provision of public and domestic charge points. These chargers will place new demands on the electrical distribution system.

The LEAP also considered the potential for heat networks in York. One area identified was around Acomb and Rufforth. Subsequent discussion with the CYC has highlighted that this is a low priority area. However, in the future, heat networks will need to be supplied from low carbon heat. Harewood Whin GEP could provide a location for the energy centre, supplied with low carbon energy to supply a future heat network. However, this solution is not likely to be needed in the short to medium term.

Figure 20: LAEP Density of buildings recommended for connection to district heat network in medium ambition scenario (red) and high (yellow) (Ref: ESC)



7.1.2 York Heat Network Study: Zoning Assessment

Dated October 2023, this report forms part of DESNZ work packages aimed at establishing heat network zones in the York area (zones where a heat network solution is the lowest cost/lowest carbon solution for decarbonisation of heat), undertaken by Arup. The report assessed the impact of future electricity demand increases due to individual heat pumps, heat network zones implementation, and uptake of EV charging by

the population and companies in the York area. It was found that peak demand would significantly increase as a result, requiring upgrades to some primary substations in the area and increasing the need for local renewable energy generation combined with energy storage to mitigate peak electrical demand. The report recommends that the council prioritise or align renewable generation projects that can support substations with large projected increases in demand that exceed current headroom.

7.1.3 Seamer Carr Hydrogen Production Feasibility Study

A report produced by Ricardo for North Yorkshire Council details the hydrogen feasibility study pertaining to Seamer Carr, a waste site used by the council. Within the context of decarbonising refuse collection vehicles, the feasibility of onsite hydrogen production, storage and dispensing was assessed.

A hydrogen demand estimation was undertaken for a proposed 24 hydrogen-powered waste HGVs at Seamer Carr, a depot at which Yorwaste stores some of their fleet: 4,742 kg/month was identified as the average monthly demand for the fleet. The report explores onsite hydrogen production, importing hydrogen from offsite and business-as-usual (diesel HGVs). The report details the results from using an electrolyser sizing tool to establish an optimal size for the site, taking into account the water supply, purification system, electricity supply, compressors, and storage of hydrogen. Costs were estimated for different components of the system, including an assumed capital cost of the electrolyser: £867/kW.

Table 9: Summary of modelled scenarios including cost and electrolyser sizing from the Seamer Carr Hydrogen feasibility study.

Component	Solar only Scenario	Wind only Scenario	Combined Scenario
LCOH (£/kg)	13.9	6.0	8.7
LCOH – Discount (£/kg)	15.7	7.4	10.0
Initial CAPEX investment	2,733,075	2,083,050	4,033,125
Yearly OPEX	642,104	233,544	833,690
Electrolyser size (MW)	1.5	1.0	2.5

The levelised cost of hydrogen was estimated for each scenario, with the report identifying that wind power offers more consistent power, meaning that the size of the supply needed for electrolysis is reduced when compared to solar. The high-level model concluded that wind power was the source that should be considered for Seamer Carr in order to generate green hydrogen onsite.

The cost for retrofitting diesel HGVs for hydrogen is listed in the report as £45,000 – £55,000 per vehicle, whereas purchasing new hydrogen refuse HGVs costs >£850,000. This figure is aligned with the cost reported by CYC fleet management to Arcadis.

The report also explored the water requirement for the generation of hydrogen, stating that water treatment is necessary onsite to maintain the electrolyser. As water is consumed during electrolysis, a constant supply is needed. The explored options varied from 49 - 67 litres of water required per kg of hydrogen produced, which would require a significant water supply onsite.

Case studies on successful implementation of Hydrogen-powered refuse HGVs were reviewed in the report including St. Helens Borough Council, Aberdeen City Council, and Glasgow Council.

8 Potential Scope of Harewood Whin GEP Project

The current phase of the Harewood Whin GEP project (the £243,500 York and North Yorkshire Net Zero Fund to June 2025) aims to assess the feasibility and viability of green energy generation technical solutions that could be delivered at the Harewood Whin site. This includes analysis of potential green energy generation solutions, grid connections, environmental considerations and planning permission requirements in collaboration between CYC, Yorwaste and specialist consultancy support. Project approval to progress will be undertaken by the CYC Executive through a series of business cases, the Strategic Outline Business Case (SOC), Outline Business Case (OBC) and Full Business Case (FBC) with approval to proceed (or not) provided at each stage.

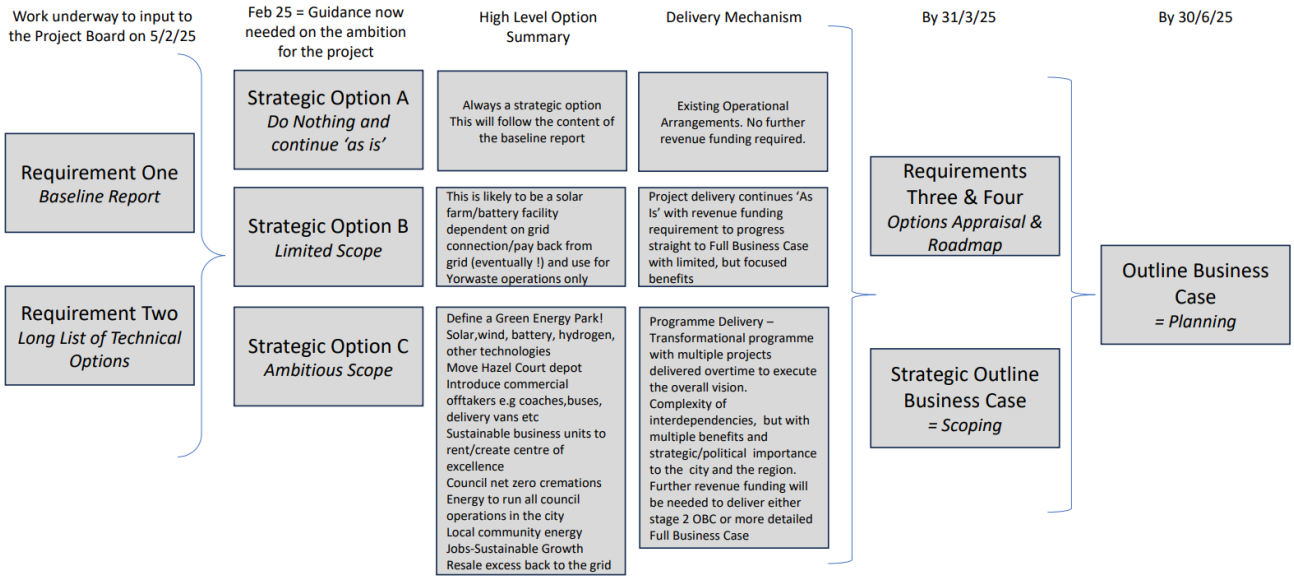
The aim of this process will be for the CYC Executive to agree on a preferred way forward for the Harewood Whin GEP from a series of potential technical/delivery options at the SOBC stage.

At the OBC stage, the CYC Executive will be required to agree (or not) a final technical option to progress into implementation, including budgets and any associated procurement exercises.

The current scope of work associated with the £243,500 York and North Yorkshire Net Zero Fund is to take the Harewood Whin GEP project to OBC stage resulting in a go/no go decision to develop the GEP. Full Business Case development and any budget to implement the project is currently out of scope.

Below is the high-level strategic plan:

Figure 21 Harewood Whin GEP Business Case Strategic Plan



9 Project Benefits, Risks, Constraints and Dependencies

Initial project benefits, risks, constraints and dependencies are noted below. These are subject to change as the project develops.

9.1 Benefits

Benefits:		
Benefit	**Class**	**Measurement**
Income generation from the sale of electricity	Financial	Monthly performance data
Cost savings on council's electricity bill	Financial	Budget monitoring and end of year report
Carbon savings associated with renewable energy generation	Non-Financial	Annual carbon savings calculated by determining the electricity generated by the electricity generating assets per year (kWHs) and then converting this into carbon savings using a GHG conversion factor. The GHG conversion factors will be derived from the UK Government's Greenhouse gas reporting conversion factors. Carbon savings will be reported in the annual operational and city-wide carbon emissions reports
Local community benefits	Non-Financial	Local resident survey
Biodiversity enhancements on site	Non-Financial	DEFRA biodiversity metric tool used to calculate biodiversity net gain (BNG) Natural capital benefits will be quantified using the Enabling a Natural Capital Approach (ENCA) guidance as recommended within the HM Treasury Green Book.
Increased local awareness, knowledge, and support of large-scale energy generation and low carbon technologies	Non-Financial	Resident surveys prior to and after community engagement
Reputational enhancement of the council	Non-Financial	Annual resident survey
Contribution towards council's strategic objectives	Non-Financial	Local energy generation capacity increase; and carbon savings calculation
Local supply chain development	Non-Financial	Value of contracts with local suppliers as a result of the project
Job Creation	Non-Financial	Jobs created during design, build, operation and maintenance of a GEP.
Sustainable Economic Growth	Non-Financial	Economic benefits to York and region by instigating green growth.

9.2 Risks

Pre-Construction Risks:			
Risk	**Risk Detail**	**Implications**	**Controls**
Failure to secure a viable grid connection	1. Failure to identify and/or secure a cost-efficient/viable cable route to the point of connection. 2. Insufficient capacity in local distribution network. 3. Costs for distribution and/or transmission network reinforcement make project financially unviable. 4.Significant delays for distribution and/or transmission network reinforcement (note: up to 10-15yrs in some particularly constrained network areas). 5. Cumulative impact of other solar farms in close proximity to the Harewood Whin site if these other applicants secure grid connections before CYC.	1. Project cessation and/or delay (due to negotiation). 2. Extra legal costs and additional costs associated with alternative routing around third party land. 3. Increased costs, changes to the economic business case. 4. Potential costs sunk costs of G99 application (~£11k) if project is terminated ('sunk costs').	1. Conduct an early assessment of network capacity during feasibility stage. NPG's 'generation heat map' can be used to provide an initial indication of available capacity. 2. Request budget estimates from NPG during pre-feasibility to provide early indication of potential connection costs. 3. Progress with G99 application quickly to mitigate potential 'interactive queue' issues. 4. Conduct a cost analysis of the potential cable routes proposed by NPG in their connection offer. 5. Request support from grid connections expert to increase likelihood of a successful application and connection offer. 6. Involve CYC Legal Services in the wayleaves/easement negotiation process for cable routing, if required. 7. Quote from an Independent Connection Provider (ICP) for an alternative cost estimate for contestable works, to potentially save costs. 8. Undertake sensitivity analysis to evaluate the impacts of all potential pricing scenarios. 9. Consider altering the scope of the project and exploring a smaller-scale renewable energy development on-site with a lower export/import capacity from the distribution network, to overcome
Failure to obtain planning permission	1. Cumulative impact of other solar farms or developments in close proximity to the Harewood Whin site. 2. Objection from LPA Planning Officers, statutory consultees, local residents, or other stakeholders during planning consultation.	1. Project cessation. 2. Potential costs incurred for planning application, documentation, and surveys if project is terminated ('sunk costs'). 3. Additional costs to appeal the refused application and/or to revise project scope/design or resubmit planning application.	1. Pre-application discussions held at early stage with Local Planning Authority. 2. Pre-planning community engagement conducted to involve key stakeholders and local communities in early discussions around the proposed development. 3. Progress the planning application swiftly to mitigate potential issues of cumulative impact in the planning process. 4. Procure external Planning Consultant expertise to support with conducting necessary surveys and compiling necessary documentation to support the planning application

Project becomes unfeasible/ unviable	1. Failure to secure and establish grid connection. 2. Failure to secure planning permission. 3. Challenges in obtaining wayleaves or easements over third party land. 4. Wholesale prices/price projections are lower than the modelled predictions. 5. Changes to economy cause inflationary cost increases for goods and services. 6. Wrong assumptions in the financial model.	1. Project cessation and/or delay (due to negotiation). 2. Extra legal costs and additional costs associated with alternative routing around third party land. 3. Increased costs, changes to the economic and financial cases of the business case. 4. Forecasted revenues may be lower than predicted, thus impacting affordability (i.e., extending payback period beyond the threshold agreed in the contract).	1. Undertake sensitivity analysis during the business case development to evaluate the impacts of changes in key variables such as potential pricing scenarios. 2. Conduct cost analysis of the potential cable routes proposed by NPG during the Connection Offer stage. 3. Involve Legal Services team in the wayleaves/easement negotiation process. 4. Seek quote from an Independent Connection Provider (ICP) for the contestable works section of the Connection Offer. 5. Consider alternative revenue streams that have the potential to reduce risk and increase revenues such as private wire and sleeved PPAs. 6. Consider implementing battery storage, and participating in national grid services to increase project viability. 7. Consider revising project scope to a more feasible/viable option - e.g. battery storage with national grid services to increase revenue; or conversion of project from 'in front of the meter' to 'behind the meter' solution if grid connection makes project unviable.
Resistance and/or objection to project proposals by local residents, businesses, and other key stakeholders	1. Objections raised during planning consultation process. 2. Poor community engagement throughout project including failure to involve community in pre-planning consultation. 3. Strong local resistance and opposition towards large-scale renewable energy development.	1. Impact on CYC reputation and relationship with local community and/or wider public. 2. Rejection of project proposals and potential delays or inability to progress the project.	1. Engage with local communities and key stakeholders early in project development (prior to planning application submission). 2. Relay key messages and deliver a series of community engagement events to seek feedback and opinions of local community. 3. Consider appointing community engagement support for the project. 4. Ensure local residents and key stakeholders are involved and frequently engaged throughout the project.
Hessay Solar 2	1. Hessay Solar 2 being granted planning permission could impact ability to gain Harewood Whin planning and also impact grid connection ability. 2. Potential opportunity to colloborate with Hessay Solar 2 to reduce costs (construction/grid connection).	1. Harewood Whin not granted planning permission. 2. Harewood Whin grid connection more difficult.	1 Proactivly engage with Hessay Solar 2 on mutually beneficial solutions to grid connection.

9.3 Constraints & Dependencies

Constraint / Dependency:		
Constraint / Dependency	**Type**	**Notes**
Project funding beyond OBC	Constraint	No further funding to implment GEP post OBC.
Grid Connection	Constraint	National grid connection for generation is constrained in the York area.
Grid Connection	Dependency	National grid connection is required to maximise benefit of generation from site.
Hessay Solar 2	Constraint	Adjacent solar farm may constrain grid connection ability of HW.
Hessay Solar 2	Dependency	Option to link into adjacent solar farm for export of HW electricity dependant on Hessay Solar 2 infrastructure being in place.
Planning	Constraint	Planning permission may reduce generation options on HW site.
Planning	Dependency	Planning permission is required before development.
National Grid Reinforcement	Dependency	National grid reinforcement in the region could impact new generation connections to 2032
CYC Net Zero	Dependency	CYC achieving net zero is dependant on low carbon initiatives such as HW GEP.
CYC Waste Fleet EV Transition	Dependency	CYC waste fleet achieving net zero/EV fleet is dependant on low carbon initiatives such as HW GEP.

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