Notice of a public meeting of

Climate Emergency Policy and Scrutiny Committee

To: Councillors Vassie (Chair), Baker (Vice-Chair), S Barnes, Cullwick, D Myers, Perrett and Wann

Date: Tuesday, 28 February 2023

Time: 5.30 pm

Venue: The George Hudson Board Room - 1st Floor West Offices (F045)

AGENDA

1. Declarations of Interest
At this point in the meeting, members are asked to declare any personal interests not included on the Register of Interests, any prejudicial interests or any disclosable pecuniary interests which they may have in respect of business on this agenda.

2. Minutes (Pages 1 - 6)
To approve and sign the Minutes of the meeting held on 13 December 2023.

3. Public Participation

At this point in the meeting members of the public who have registered to speak can do so. Members of the public may speak on agenda items or on matters within the remit of the Committee. **Please note that our registration deadlines are set at 2 working days before the meeting, in order to facilitate the management of public participation at our meetings.** The deadline for registering at this meeting is **5:00pm on Friday 24 February 2023**.

To register to speak please visit www.york.gov.uk/AttendCouncilMeetings to fill in an online registration form. If you have any questions about the registration form or the meeting, please contact Democratic Services. Contact details can be found at the foot of this agenda.

Webcasting of Public Meetings
Please note that, subject to available resources, this meeting will be webcast including any registered public speakers who have given their permission. The meeting can be viewed live and on demand at www.york.gov.uk/webcasts.

During coronavirus, we made some changes to how we ran council meetings, including facilitating remote participation by public speakers. See our updates (www.york.gov.uk/COVIDDemocracy) for more information on meetings and decisions.

4. BioYorkshire (Pages 7 - 26)
This report provides the Committee with an update regarding the work of BioYorkshire.

5. Tree Canopy Target Update and York Green Streets (Pages 27 - 60)
The report provides an update on progress towards York's tree canopy expansion target. This work encompasses the delivery of York Community Woodland (YCW) and York Green Streets (YGS), a new project aiming to enhance tree planting in the city's urban and peri urban areas from April 2023.

6. Climate Change Strategy: Strengthening York's Resilience to Climate Change (Pages 61 - 88)
This report provides the Committee with an update on the Council's adaptations to become more climate resilient.

7. Highway Verge Wild Flowering (Pages 89 - 112)
This report outlines the policy and decision making that underlies a range of projects carried out over the last two years to develop highway verges and grassland for pollinators.

8. LED Lighting Update Solar Lighting (Pages 113 - 178)
This report provides an update on the conversion of the council's street lamp columns to LED and reviews the progress of the technology of solar lighting and its suitability for street lighting.

9. Urgent Business
Any other business which the Chair considers urgent under the Local Government Act 1972.

Democracy Officer:

Name: Robert Flintoft
Telephone: (01904) 555704
E-mail: robert.flintoft@york.gov.uk

For more information about any of the following please contact the Democratic Services Officer responsible for servicing this meeting:

- Registering to speak
- Business of the meeting
- Any special arrangements
- Copies of reports and
- For receiving reports in other formats

Contact details are set out above.

This information can be provided in your own language.

我們也用您們的語言提供這個信息 **(Cantonese)**

এই তথ্য আপনার নিজের ভাষায় দেয়া যেতে পারে। **(Bengali)**

Ta informacja może być dostarczona w twoim własnym języku. **(Polish)**

Bu bilgiyi kendi dilinizde almanız mümkündür. **(Turkish)**

یہ معلومات آپ کی اپنی زبان (بولی) میں بھی مہیا کی جاسکتی ہیں۔ **(Urdu)**

☎ **(01904) 551550**

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City of York Council	Committee Minutes
Meeting	Climate Emergency Policy and Scrutiny Committee
Date	13 December 2022
Present	Councillors Vassie (Chair), Cullwick, D Myers, Perrett and Wann
Officers in Attendance	Claire Foale - Assistant Director Policy and Strategy James Gilchrist - Director of Environment, Transport and Planning Shaun Gibbons - Head of Carbon Reduction Corporate Strategy Dave Meigh – Operations Manager
Apologies	Councillor Baker

14. Declarations of Interest

Members were asked to declare, at this point in the meeting, any personal interests, not included on the Register of Interests, or any prejudicial or disclosable pecuniary interests that they might have had in respect of business on the agenda. None were declared.

15. Minutes

Resolved: That the minutes of the meeting held on 4 October 2022 be approved and signed as a accurate record by the Chair.

16. Public Participation

It was reported that there was one registration to speak under the Council's Public Participation Scheme.

Debby Cobbett requested that the Council move at a quicker pace to tackle emissions in the city. She suggested there was a need for more retrofitting jobs and highlighted work undertaken at York Disability Week. Finally she asked for representation for Trade Unions on York's Climate Commission.

17. York: Local Area Energy Plan

The Committee welcomed Karl Sample from Energy Systems Catapult (ESC) who had produced the Local Area Energy Plan's for North Yorkshire and had done a specific plan for York. The Committee were introduced to the report and informed of the challenges to decarbonising York's energy system. It was confirmed that the plan had been developed in conjunction with North Yorkshire who aimed to reach their carbon negative goal by 2040, therefore, York would need to move at a faster pace to achieve its target of net zero carbon emissions by 2030.

Members discussed the outcome of the modelling which provided a framework for when and what should be done to achieve net zero. The estimated £3.8 billion investment required to decarbonise the energy system was discussed as it was noted that funding external to the Council's budget would be required. Officers noted that the cost, while high, included inherent costs such as replacements of boilers and it was agreed that improvements in areas such as retrofitting would be both a benefit to decarbonisation as well as reducing household bills. The Committee enquired about the possibility of including case studies of work undertaken elsewhere as reference points for specific programmes that could be undertaken to meet objectives outlined by the model.

Supporting residents to reduce emissions was discussed around support for retrofitting in the HUG scheme and access to electric vehicle charging. It was noted that York had more electric vehicle charging points than anywhere in the UK outside of London, however, York remained behind many other European cities. Support for charging at the 52% of York homes which don't have access to off street parking was considered, the Council's Eclectic Vehicle Charging Strategy was cited with its plans for hyper hubs and charging in Council car parks to support homes unable to charge from home.

The Committee enquired about potential options for decarbonisation which had not been identified by the modelling or not included within the report. Geothermal heating from the North Selby Mine it was noted could be an option for discussion but could not be included in the model due to their being too many variables for the ESC models to see it as a worthy inclusion. It was also confirmed that officers would review the regional plans to see if heating from Allerton Waste Recovery Park and whether this could form part of York's Local Area Energy Plan. Offshore wind farms were also discussed and their role in producing hydrogen energy. It was confirmed that the model for York had not identified offshore wind as part of its plan, but due to the potential of the Yorkshire coastline the Committee

requested that work be undertaken to explore joint working with North Yorkshire to use offshore wind production.

Resolved:

i. That the Executive Member for Environment and Climate Change be requested to call for the Local Area Energy Plan to provide clear figures for the projected carbon emissions saving that would be delivered if the proposed Building Upgrade referred to in the plan are implemented, so that these can be measured against the annual carbon emissions saving required by the Climate Change Strategy and the council's commitment to achieve Net Zero by 2030.

ii. That Officers check the role of geothermal energy and Allerton Waste Recovery Park in nearby Councils regional local area plans.

iii. That the Executive Member for Environment and Climate Change be requested to explore with North Yorkshire Council the potential of using offshore wind production to support energy generated for the benefit of the region.

Reason: To support the accelerated delivery of decarbonisation to achieve the council ambition for York to be net zero by 2030.

18. City of York Council: Annual Carbon Emissions Report 2021/22 and York Emissions Inventory Report 2022

Officers introduced the Council's Annual Carbon Emissions Report 2021/22. It was noted that data from the pandemic was hard to compare to current figures showing in some instances drastic differences due to changes in working patterns. Compared to pre-pandemic data it was noted that the Council had made progress in reducing emissions. Officers also presented a second report on the city's emissions and it was noted that emissions had reduced by 2.6% from 2018 to 2019.

The Committee welcomed the work undertaken in recent years to gather the data presented in the reports. It was discussed that the city wide reduction of 2.6% was positive but that reductions would need to be done at a far more rapid pace to reach the Council's target of net zero emissions by 2030. How we measure Scope 3 emissions were discussed and officers confirmed that the Local Enterprise Partnership had a framework for measuring scope 3 on construction projects.

The city's street lighting was discussed and whether the Council was able to move to a metered supply for the lighting and therefore save money. Officers confirmed that currently the lights are not on a metered supply and the cost of more than 20,000 meters would be considerable. It is possible to model power usage relatively accurately but as they are wired into the main supply network the cost is always through negotiation.

Resolved:

i. That the report be noted.

Reason: To support the accelerated delivery of decarbonisation to achieve the council ambition for York to be net zero by 2030.

19. Pollinator Strategy Update

The Committee welcomed the work undertaken in the Pollinator Strategy and were informed of how it had been incorporated into operations and projects. It was confirmed that the Council was going to begin a three year trial monitoring pollinator activity across the city and that Councillors were welcome to recommend locations for monitors for the trial.

Resolved:

i. That the report be noted.
ii. That all Councillors be contracted about potential locations in their wards for pollinator sensors.

Reason: To improve suitable habitat within York for pollinators.

20. Work Plan 2022/23

The Committee considered its work plan for 2022/23. It was noted that two items had been deferred from this meeting to the Committee's final meeting of the municipal year on 28 February 2023. The Committee requested that reports for Adaptations: Climate Risk Resilience priorities for York and Adaptations: Natural flood resilience project be shared ahead of agenda publication if possible to give Members additional time to consider the reports.

Resolved:

i. That the work plan be noted.

ii. That reports for Adaptations: Climate Risk Resilience priorities for York and Adaptations: Natural flood resilience project be shared with the Committee as early as possible.

Reason: To ensure the Committee has a programme of work.

Cllr C Vassie, Chair
[The meeting started at 5.34 pm and finished at 7.42 pm].

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Climate Emergency Policy and Scrutiny Committee **28 February 2023**

Report of the Assistant Director of Policy and Strategy
Portfolio of the Executive Member for Environment and Climate Change

BioYorkshire

Summary

1. The Climate Change Strategy and Economic Strategy were approved by Council in December 2022 which recognise the strategic importance of the bio-economy to both York and North Yorkshire. Both strategies reference BioYorkshire as a key strength in delivering York's ambitions to reach net zero and increase higher value 'green' jobs.

2. BioYorkshire is a cluster of excellence for the bioeconomy, delivering innovation, inward investment and high value jobs supporting both the UK levelling up objectives and delivering on national net zero ambitions. It is led by Fera Science Ltd., Askham Bryan College and the University of York.

3. BioYorkshire is also part of the York and North Yorkshire devolution deal which commits to establishing a Programme Working Group with senior IUK and UKRI membership including relevant agencies, York and North Yorkshire Combined Authority, University of York, Fera Science Ltd, and Askham Bryan College will be established.

4. An update about BioYorkshire, including progress to date, is attached (Annex A).

Contact Details

Author:	**Chief Officer Responsible for the report:**
Shaun Gibbons Head of Carbon Reduction	Claire Foale Assistant Director Policy and Strategy

Report Approved	√	**Date**	17 February 2023

Wards Affected: **All** √

For further information please contact the author of the report

Background Papers:

Council December 2022
Agenda for Council on Thursday, 15 December 2022, 6.30 pm (york.gov.uk) item 36

Devolution Deal: York and North Yorkshire devolution deal - GOV.UK (www.gov.uk)

Annexes
Annex A: BioYorkshire and the green economy

BioYorkshire

Driving prosperity and innovation through the bioeconomy

BioYorkshire and the Green Economy

Professor Charlie Jeffery, University of York

Climate Emergency Policy and Scrutiny Committee

February 2023

York's Economic and Climate Change Strategies and BioYorkshire

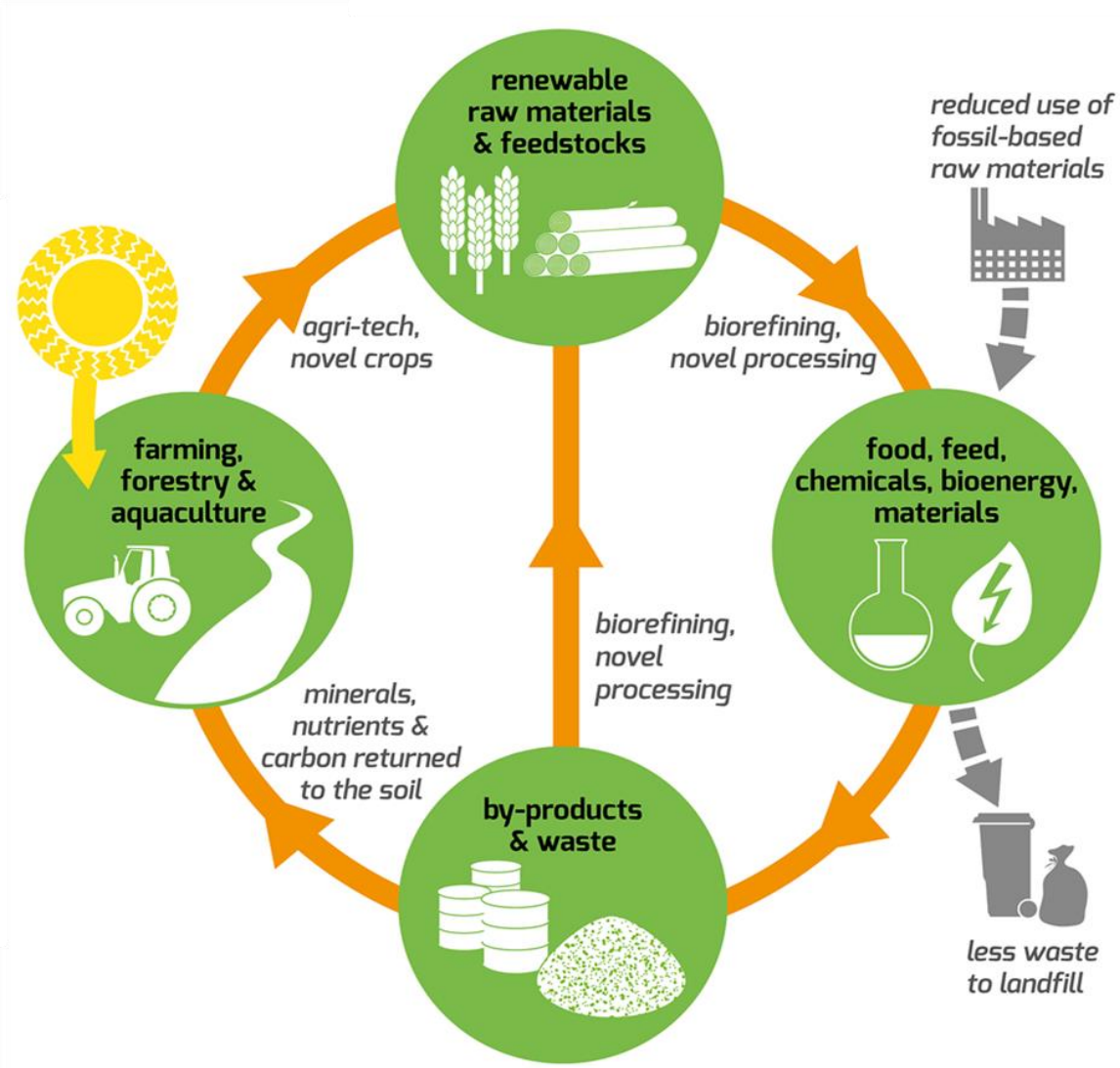
Economic Strategy	
York as a global city	✓
A greener economy	✓
A thriving workforce	✓
Thriving businesses	✓
An economy driven by good business	✓

Climate Change	
Grow the green economy	✓
↓ Waste & ↑ recycling	✓
Move towards circular economy	✓
Promote sustainable land management	✓
↑ Renewable energy generation	✓

BioYorkshire

- Net zero
- Biodiversity recovery

The Bioeconomy and why it is important



Economic Strategy

- York as a global city ✓
- A greener economy ✓
- A thriving workforce ✓
- Thriving businesses ✓
- An economy driven by good business ✓

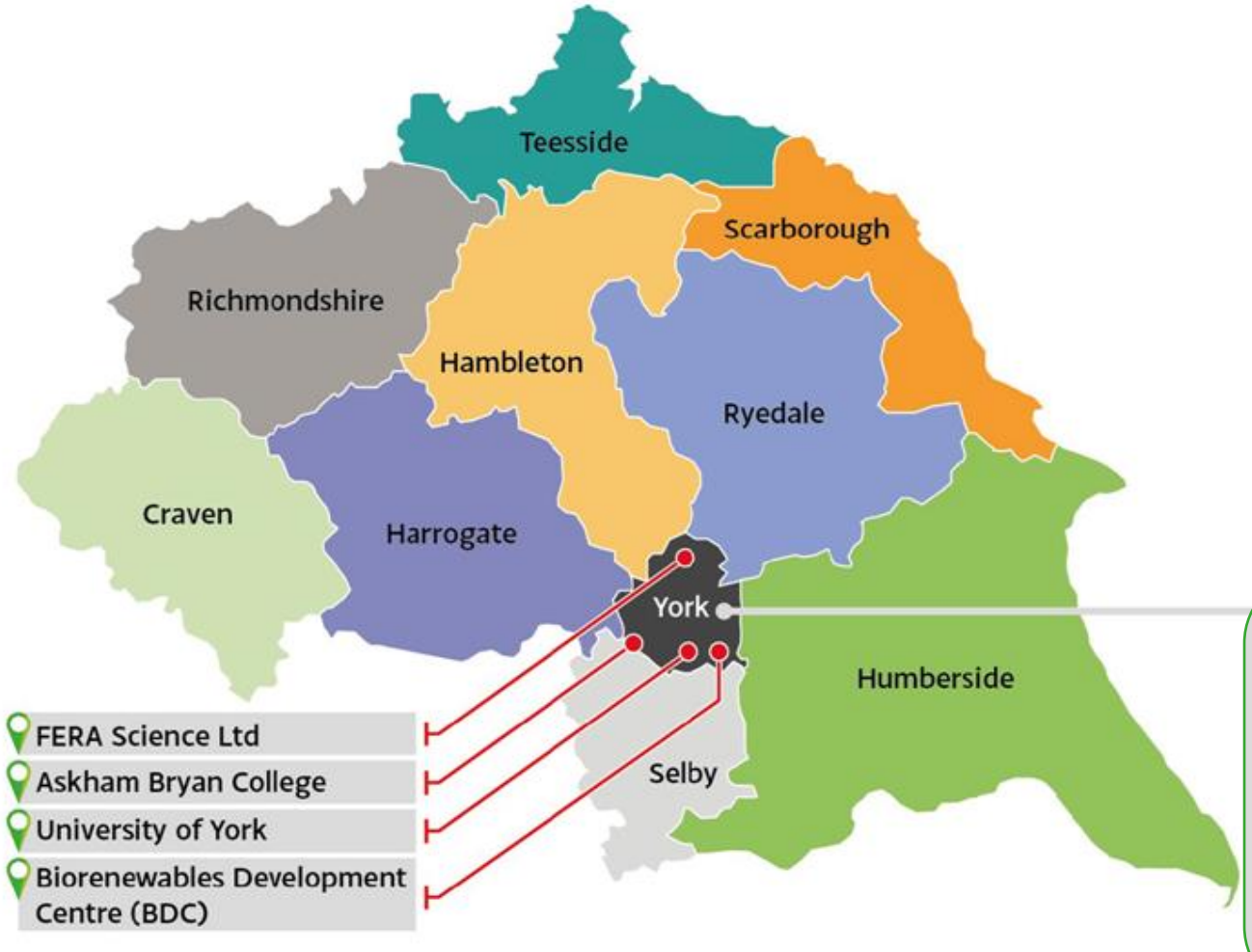
BioYorkshire

Net zero food production, farming and wider land use practices

BioYorkshire

Profitable bio-based production of chemicals, materials and fuels

BioYorkshire



Yorkshire based – encompassing north of England

Innovation pillar of the York & North Yorkshire devolution deal

BioYorkshire's key aims

powering the economy

- Adding ~£1.4bn in GVA to the UK economy
- Supporting existing industry and new small businesses
- Equipping a new bioeconomy workforce
- Creating 4,000 new jobs across Yorkshire and the UK

improving the environment

- Driving a new era of nature positive, bio-manufacturing and sustainable farming
- Reducing 2.8 million tonnes annually of CO2e carbon emissions
- Reducing UK waste to landfill by 1.2 million tonnes/ year

boosting innovation

- Advancing a research and innovation pipeline
- Creating and growing companies to produce nature positive, bio-based products and processes
- Establishing a bioeconomy 'cluster development corporation'
- Transforming the UK's bioeconomy

Climate Change	
Grow the green economy	✓
↓ Waste & ↑ recycling	✓
Move towards circular economy	✓
Promote sustainable land management	✓
↑ Renewable energy generation	✓

Economic Strategy	
York as a global city	✓
A greener economy	✓
A thriving workforce	✓
Thriving businesses	✓
An economy driven by good business	✓

Innovation & Skills Central

Integrated delivery of bioeconomy innovation and skills

Bioeconomy Skills Academy | Sustainability Learning Centre
Global Bioeconomy Institute | Biorenewables Development Centre
Circular Economy Data Centre | Packaging Hub | Living Lab
Digital and Robotic Process Control Automation Centre | Agriculture Incubator Hub

District Hubs

Bioeconomy start-ups embedded in the communities

Accelerator

Maximising impact, advantage and investment

BioYorkshire Industrial Advisory Group

- Chaired by Steve Bagshaw, CBE
- Diverse membership to represent bioeconomy relevant sectors: chemicals, food, agri-tech, biotechnology, energy, leisure, personal care, technology, utilities, construction
- Large companies and SMEs
- Meets quarterly to discuss bioeconomy developments, network and advise BioYorkshire

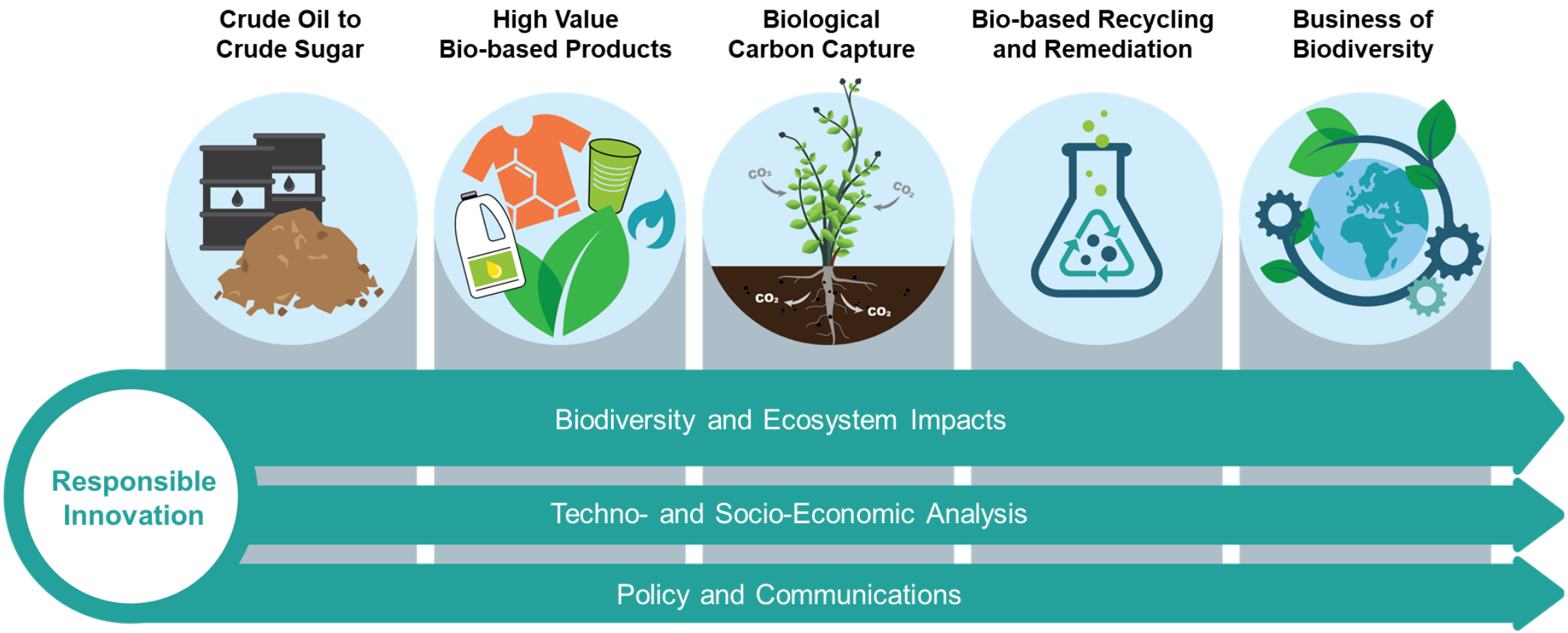
Global Bioeconomy Institute

Addressing the challenges of net zero and biodiversity loss, whilst feeding a growing global population and using bio-based feedstocks to replace petrochemicals

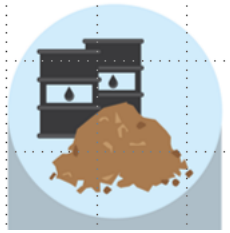
Objectives:

- Excellence in interdisciplinary, discovery research
- Industrially driven research, demonstration and scale-up
- UK's bioeconomy hub
- Supporting education and training

Global Bioeconomy Institute



Bioeconomy Solutions to Climate Change and Biodiversity Loss



From crude oil to crude sugar

Petrochemicals

fossil fuel → CRUDE OIL → Refinery → olefins aromatics

refinery products: petroleum, aviation fuel, chemicals, dyes, solvents, detergents, adhesives, plastics, agrochemicals etc.

First Generation Sugars

sugar/ starch → SUGAR → Biorefinery – industrial biotech → olefins polyolefins

Second Generation Sugars

biomass lignocellulose → conversion → CRUDE SUGAR → polyolefins olefins

biomass lignocellulose → conversion → LIGNIN → aromatics

innovation

bio-based products: aviation fuels, bioethanol, biodiesel, organic acids, bioplastics, polymers, solvents, detergents, biogas, animal feed, proteins, sugars, etc.

bio-carbon capture construction materials

Bioeconomy Skills Academy

- Inclusive education programmes for learners at all levels
- Regional needs, as well as national and international students
- Addresses the need for skilled workers from bioeconomy industries
- Creates demand and interest for bioeconomy skills and education
- Supports careers for the bioeconomy sector

BioYorkshire

BioYorkshire District Incubator Hubs

- Focus points for businesses across Yorkshire to connect with each other and with BioYorkshire Innovation & Skills Central
- Three early examples:

A coastal-based Hub in Scarborough – Anglo-American funding for SME support programmes, links to a series of marine-based activities including SeaGrown, an innovative seaweed farming business.

A rural-based Hub in Malton – Circular Malton, a town led initiative to establish a community anaerobic digestion facility that uses waste to generate energy. Plans are being developed for a bioeconomy business incubator adjacent to this AD plant.

An urban-based Hub in York – the Biorenewables Development Centre site on the offers open access scale up and analytical facilities for businesses. Space on this site is being used to create an ecosystem of bioeconomy companies.

BioYorkshire Accelerator

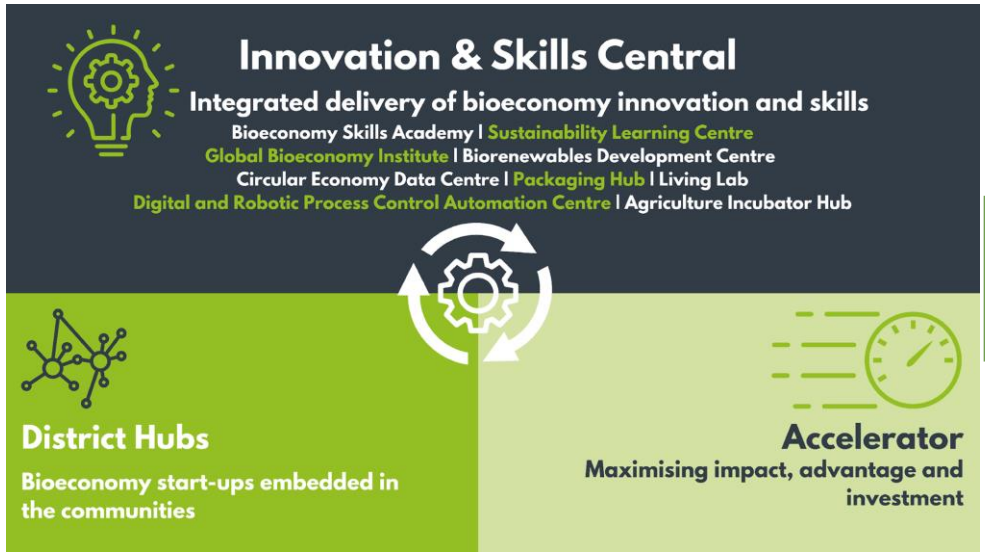
Maximising impact, advantage and investment:

- improving connectivity
- supporting bio-based entrepreneurship
- bringing global visibility to YNY as a centre of excellence for the bioeconomy

BioYorkshire and Levelling Up

LEVELLING UP MISSIONS		BIOYORKSHIRE OUTPUTS
1/ Pay, Employment & Productivity – increases across UK, globally competitive city in each region, performance gap closes		4000 jobs created, pay & productivity boosted, especially in rural and agrarian areas
2/ Increase in public investment in R&D – leverage private sector investment; stimulating innovation and productivity growth		Bioeconomy cluster attracts inward investment and high growth export markets
6/ Increase in high quality skills training across the UK		Skills offer co-ordinated across BioYorkshire, new facilities and opportunities for learners
12/ Devolution deals		Innovation focus creates economic and green growth

BioYorkshire and York's Economic and Climate Change Strategies



Economic Strategy

- York as a global city ✓
- A greener economy ✓
- A thriving workforce ✓
- Thriving businesses ✓
- An economy driven by good business ✓

Climate Change

- Grow the green economy ✓
- ↓ Waste & ↑ recycling ✓
- Move towards circular economy ✓
- Promote sustainable land management ✓
- ↑ Renewable energy generation ✓

BioYorkshire

Driving prosperity and innovation through the bioeconomy

www.bioyorkshire.co.uk

Sign up to find out more about BioYorkshire

Name

Email Address

Submit

Climate Emergency Policy and Scrutiny Committee **28 February 2023**

Report of the Assistant Director of Policy and Strategy
Portfolio of the Executive Member for Environment and Climate Change

Tree Canopy Target Update and York Green Streets

Summary

1. The report provides an update on progress towards York's tree canopy expansion target. This work encompasses the delivery of York Community Woodland (YCW) and York Green Streets (YGS), a new project aiming to enhance tree planting in the city's urban and peri urban areas from April 2023.

Recommendations

2. The committee is asked to:

I. Note the progress made on expanding York's tree canopy cover, including the achievement of key milestones in line with Council Plan 2019-23 commitments.

II. Note and comment on proposals for enhancing York's urban tree canopy cover via the YGS project and monitoring wider tree planting contributions to enable a more comprehensive picture of tree canopy expansion to be given.

Reason: To support the Council Plan priority for a greener and cleaner city and Climate Change Strategy objectives, including enhanced natural capital and tree canopy cover.

Background

3. In 2019, the council set an ambition to achieve net zero carbon by 2030 in response to the climate emergency. As part of this, the council committed to planting 50,000 trees by the end of the Council Plan 2019-23 period to help mitigate against residual CO_2 in the atmosphere.

4. In Autumn 2020, the council purchased land in the west of York between the villages of Knapton and Rufforth for the purpose of creating a new large-scale community woodland. Together with existing landholdings the site comprised a total of 78ha.

5. The White Rose Forest (WRF) commissioned a one-off study of district level tree canopy cover in 2019 to inform the development of district level expansion targets to feed into the WRF Plan. York's canopy cover at this time was assessed as 2,926ha, representing 10.8% of its total area, with 60% of this being made up of trees outside woodlands.

6. The Executive Member for Environment and Climate Change at a public Decision Session on 5 May 2021, agreed a new tree canopy expansion target for the city to feed into the regional WRF Plan. The target aims to increase York's tree canopy cover to 13% by 2050 - roughly equating to 21ha of additional canopy cover each year.

7. The Executive Member for Environment and Climate Change at a Decision Session on 7 September 2022, considered a report outlining opportunities for further tree canopy expansion in York's urban and peri-urban areas. This 'York Green Streets' report identified 63 technically feasible planting locations across the city accommodating up to c4,000 trees.

8. In December 2022, Council approved the Climate Change Strategy 2022-2032 including objectives to increase tree planting, increase carbon storage, promote sustainable land management, reduce the impacts of extreme weather events and climate risks.

9. Progress against these targets is detailed below. The Council has successfully secured c£1.35m of external funding for the creation of York's Community Woodland, mapping of potential locations for additional urban trees, and more recently, funding capacity to engage neighbourhoods and arrange planting of more urban trees – all aimed at increasing York's tree canopy and contributing towards York's ambition to be net zero by 2030.

10. A programme to better understand York's climate risks is underway. It is too early to pre-empt the outcome of this, however, we do know that one of the key adaptations to the risk of over-heating infrastructure such as roads and buildings is a tree canopy that can withstand drought and extreme cold.

Progress update

York Community Woodland

11. Since project inception in September 2020, the following key milestones have been delivered:

I. Secure external funding to support the council's YCW project team, minimising call on the council's 'Northern Forest' budget: A £110,000 grant over two years was obtained from the WRF.

II. Establish robust project governance and management arrangements including an ambitious delivery pathway/project plan to deliver Council Plan pledges: A multi-disciplinary project team has ensured wider project benefits are maximised.

III. Complete all necessary land character, heritage, ecology, soil and transport assessments in a timely manner to meet regulatory requirements and inform the development of initial woodland concept plans. The council accessed specialist support from the WRF core team and successfully applied for a Forestry Commission Woodland Creation Planning Grant totalling £14,000.

IV. Design and implement a community and stakeholder engagement strategy to ensure the full involvement of residents and local stakeholders in the co-design of a community woodland vision and objectives. The project has benefitted from extensive public interest, input and support as a result of this approach.

V. Procure specialist woodland design services to translate the community woodland vision into a UK Forestry Standard (UKFS) complaint woodland masterplan, showing YCW spatial layout, recommended trees species and mitigations for issues raised during public consultation. Capital costs were estimated at c£1.3m (excluding long-term management and maintenance liabilities).

VI. Secure Forestry Commission (FC) regulatory approval to deliver the woodland masterplan and detailed specification. The FC is the planning authority for woodland creation in

England and, based on the work outlined above, granted woodland approval in December 2021.

VII. Procure the services of a woodland creation delivery partner with the expertise, experience and resources to deliver the woodland masterplan within strict project timescales. The council was the first in the country to enter a Forestry England (FE) Woodland Partnership arrangement, whereby FE fully fund the capital costs of woodland creation, establish the woodland over the medium term and take responsibility for woodland management for the next 120 years. The arrangement is underpinned by a formal (legal) lease and a Partnership Agreement containing arrangements for community engagement, joint governance and ongoing monitoring and reporting against project outcomes (see Annex 1). This approach delivers on the council's aim to minimise call on council resources and returns an annual rental income.

VIII. Ensure the ongoing involvement of residents in woodland creation and management. Residents have been actively involved through a series of community wildflower meadow and tree planting events, including the planting of 70 specimen trees to celebrate the Queens Jubilee year. More events are planned with the latest taking place over the February 2023 half-term. Further opportunities will be advertised through FE's dedicated YCW webpage, which allows people to sign-up for regular updates.

IX. Plant 50,000 trees by 31 March 2023. On 17 February 2023 the Lord Mayor of York, the Leader of City of York Council and the Executive Member for Environment and Climate change planted the 50,000th tree on YCW. Further planting over subsequent seasons will raise this to 210,000 trees, one for each resident of York. c66% of the 78ha YCW site (c51ha) will have canopy cover once the woodland matures. FE are currently installing initial site infrastructure, such as paths and trails and public access is scheduled for 2024.

X. Ensure project objectives are met. Over the next 100 years as the woodland matures and develops the cumulative sequestration of CO_2 will be in the region of 26,000t. These carbon credits have been registered with the Carbon Code,

directly contributing to the council's organisational net zero ambitions. There will be a significant biodiversity enhancement, including the protection and enhancement of endangered species and habitats. Residents will benefit from increased access to nature and active travel opportunities, enhancing local health and wellbeing outcomes. The ongoing process of woodland creation, establishment and management will deliver opportunities for green jobs, volunteering opportunities and skills development. A bespoke policy is in place to ensure the use of plastics is minimised, forming part of national trials (see Annex 2).

York Green Streets

12. Phase 1 of the YGS project was completed in January 2022. This consisted of an opportunity mapping exercise commissioned by CYC to identify new tree planting sites across the city's urban and peri-urban areas. This work was fully funded by a £25,000 grant from WRF.

13. The results of the mapping were reported to the Executive Member for Environment and Climate Change at a Decision Session on 7 September 2022. As part of the report, the Executive Member gave approval for officers to apply to the Forestry Commission Woodland Creation Accelerator Fund (WCAF) to support additional officer capacity aimed at turning the opportunities identified into a programme of delivery over 2023-2025.

14. The WCAF funding bid was successful, with City of York Council being awarded £150,000. Officers are in the process of recruiting to the new posts, which will sit within the council's carbon Reduction team working closely with colleagues in Public Realm and Highways. The grant is revenue based only and specifically for new officer capacity, not for the capital costs of tree purchase and planting.

15. Phase 2 of York Green Streets will commence 1 April 2023, subject to successful recruitment. Initial tasks will include identifying and securing external capital funding to support delivery, with an initial focus on the government's Local Authority Treescapes Fund (LATF) and Urban Tree Challenge Fund (UTCF), both of which will be re-launching shortly. Other capital

funding streams will also be explored, such as the Woodland Trust's Trees for Schools fund.

16. Tree planting in the locations identified through the Phase 1 mapping exercise will be subject to detailed community and elected member consultation at the local level. Individual scheme design will embrace good practice, such as sustainable urban drainage solutions where appropriate and trees species selection will follow the principle of 'right tree in the right place', including resilience to climate change and other threats.

17. There is increasing evidence of the critical role urban trees play in keeping city environments cool, whilst at the same time enhancing physical and emotional wellbeing, improving air quality and making cities attractive places to live, work and invest in. Urban treescapes are therefore an essential component of climate adaptation plans and strategies aimed at building local resilience against the risks associated with climate change.

Other work contributing to tree canopy expansion aims

18. In March 2022, the YCW project team coordinated a highly popular 'tree giveaway' event that saw residents receive 500 free trees supplied by the Woodland Trust. Tree species were those best suited to gardens and easy to maintain, such as Hazel and Rowan. There was no capacity for ongoing monitoring to assess how many of these trees were planted and successfully established.

19. The council's Public Realm team are responsible for looking after the council's tree assets. A key focus is on management and maintenance of the council's c35,000 existing trees. The council's highway trees have an asset value of around £79 million.

20. Each year, Public Realm plant on average 20-40 standard trees and hundreds of saplings which are to offset annual losses. Public Realm's 2022/23 tree planting programme will see a total of 748 trees planted. Key threats to the council's tree stock include site use changes, storm damage, age and diseases such as Ash dieback and Phytophthora. Public Realm has no specific budget for new tree planting.

21. Other bodies, organisations and parish councils also plant trees, such as the recent Environment Agency scheme on Water Lane.

Treemendous, a local voluntary organisation dedicated to tree canopy expansion in York has also initiated and delivered several planting schemes over the years, most recently along the A66 highway verge at Murton.

22. The council does not have a mechanism to capture the wider contribution private citizens and other organisations make towards York's tree canopy expansion target, nor for accurately recording the number of trees felled each year.

23. The council cannot deliver the 13% tree canopy cover by 2050 alone. This will involve contributions from all city stakeholders including private citizens, local business and organisations. Finding ways to fully account for these contributions remains challenging. In the meantime, we will continue to work through the WRF to re-assess district level canopy cover in the future.

Council Plan

24. Enhancing York's tree canopy cover, including progress delivering YCW, the emerging YGS project and ongoing work to manage the council's existing tree stocks contribute to the following Council Plan outcomes:

- A greener and cleaner city – Carbon sequestration and amenity green space
- Getting around sustainably – New pedestrian and cycle routes
- Good health and wellbeing – Creation of new open spaces to support healthy lifestyles for residents, businesses and visitors.
- Safe communities and culture for all – A range of leisure opportunities for residents
- Well paid jobs and an inclusive economy – Green skills development.

Implications

- **Financial** – There are no implications directly related to this update report.

- **Human Resources** – There are no implications directly related to this update report.

- **Equalities** – There are no implications directly related to this update report.

- **Legal** – There are no implications directly related to this update report.

- **Crime and Disorder** – There are no implications directly related to this update report.

- **Information Technology** – There are no implications directly related to this update report.

- **Property** – There are no implications directly related to this update report.

- **Other** – There are no implications directly related to this update report.

Risk Management

25. There are no direct risks associated with this update report.

Contact Details

Author:

Paul McCabe
York Community Woodland project manager
Tel: 01904554527

Chief Officer responsible for report:
Claire Foale
Assistant Director, Corporate Policy and Strategy
Tel: 01904552057
Report Approved ✓

Date 15/02/2023

Background Papers:

- Executive report 27 August 2020: Creating a new woodland/Stray for York
- Executive Member Decision Session 5 May 2021 - York's Tree Canopy Expansion Target
- Executive Member Decision Session 8 September 2021 - York Community Woodland final design, external capital funding source and delivery partner
- Executive member Decision Session 7 September 2022 - York Green Streets: Identifying opportunities for new non-woodland tree canopy cover

Annexes

1. Partnership Agreement
2. York Plastics Policy

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York Community Woodland Partnership Agreement

City of York Council and Forestry England

May 2022

Version Number: 4.0

Version	Date	Description of change	Author	Approved By
1.0	10/02/2022	Initial draft	Naomi Smith	
2.0	09/03/2022			
3.0	22/03/2022	Draft for comment from CYC		Jim Lee
4.0	20/04/2022	Comments from CYC Board and Legal team		Project Board

Contents

Signatures

This agreement is made between:

Forestry England of 620 Bristol Business Park, Coldharbour Lane, Bristol, BS16 1EJ ("Forestry England")

Signed for and on behalf of
Forestry England by: _____
Authorised Signatory

Print Name:.....

Position: _____ Date: _____

City of York Council of West Offices, Station Rise, York, YO1 6GA ("the Council")

Signed for and on behalf of
City of York Council by: _____
Authorised Signatory

Print Name:.....

Position: _____ Date: _____

The above are referred to in this Agreement collectively as 'the partnership' or individually as a 'partner'. Local partner contacts are shown in Appendix 1.

Legal Status

This Partnership Agreement sets out the shared commitments between the Council and Forestry England to achieve our joint vision of delivering York Community Woodland ("YCW")[1]. These two organisations constitute the partners involved in delivering and managing the YCW project, under Forestry England's Woodland Partnership Programme. The Secretary of State for Environment Food and Rural Affairs has/holds (on behalf of Forestry England) a lease dated [ ] from the Council for a Term of 120 years from that date ("the Lease") of the land near Knapton, York on which the woodland is to be developed ("the Site" – being the land more particularly described and demised by, the Lease as the 'Premises')) as the Council is the freehold owner of the Site.

This Partnership Agreement does not create any legal obligations or a contract between the Partners but sets out a framework for the partnership. The term 'Partner' is not used in a legal sense and any matters which are not permitted by applicable law or the constitution of each Partner, whether now or in the future, shall be removed from this document.

The Lease[2] details the legal basis on which City of York Council as landlord and Forestry England as tenant will occupy the Site for the purpose of creating and managing the woodland thereon.

This Partnership Agreement does not imply and/ or create any transfer of intellectual property rights of copyright from or to any of the Partners. Any such transfer would require a separate agreement between the Partners.

This Partnership Agreement sets out governance, roles, and responsibilities for the Partners during the woodland establishment phase, ongoing management and any future development. This Partnership Agreement may be updated to reflect future potential developments or projects, subject to written approval from both Partners.

The Agreement will be subject to formal annual review by the Project Board (as described in Section 3.2). The Project Board will decide on the review mechanism for the Partnership Agreement.

[1] City of York Council Executive Report (August 2021)
[2] York Community Woodland Lease Agreement (2022)

Section 1: Background

1.1 Project Background

In 2020, the Council purchased the Site (Figure 1), which currently comprises a 76-hectare parcel of agricultural land near Knapton to the west of York, funded through the Council's capital budget. The purpose of this land purchase was to create a significant new community woodland for the city delivering a wide range of social, environmental, and economic benefits.

The YCW project forms part of the White Rose Forest tree canopy expansion across West and North Yorkshire. This in turn contributes to the wider Northern Forest initiative that aims to plant 50 million trees across the North of England.

In September 2021, the Council announced Forestry England as their delivery partner through the Forestry England Woodland Partnership. The partnership will see Forestry England take responsibility for woodland creation and long-term management through the Lease, funded principally by the Defra Nature for Climate Fund. This Agreement sets out best practice working for Forestry England (National Woodland Creation Team and Yorkshire District Team) and the Council during the woodland establishment and ongoing management phase. The partnership will take on a different and appropriate form in each phase.

1.2 Rationale

The Lease is a legally binding contract which details the terms under which The Secretary of State for Environment Food and Rural Affairs (on behalf of Forestry England) rents the Site from the Council. This Partnership Agreement is not legally binding but helps to set out a framework for partnership activities. This Agreement sets out the joint desired outcomes (Section 2), partner responsibilities and governance (Section 3), guidance on decision-making and negotiations (Section 4), and monitoring performance against milestones and KPIs (Section 5). On the signing of this Agreement, both Parties agree that they will work to this guidance to deliver the shared vision and objectives.

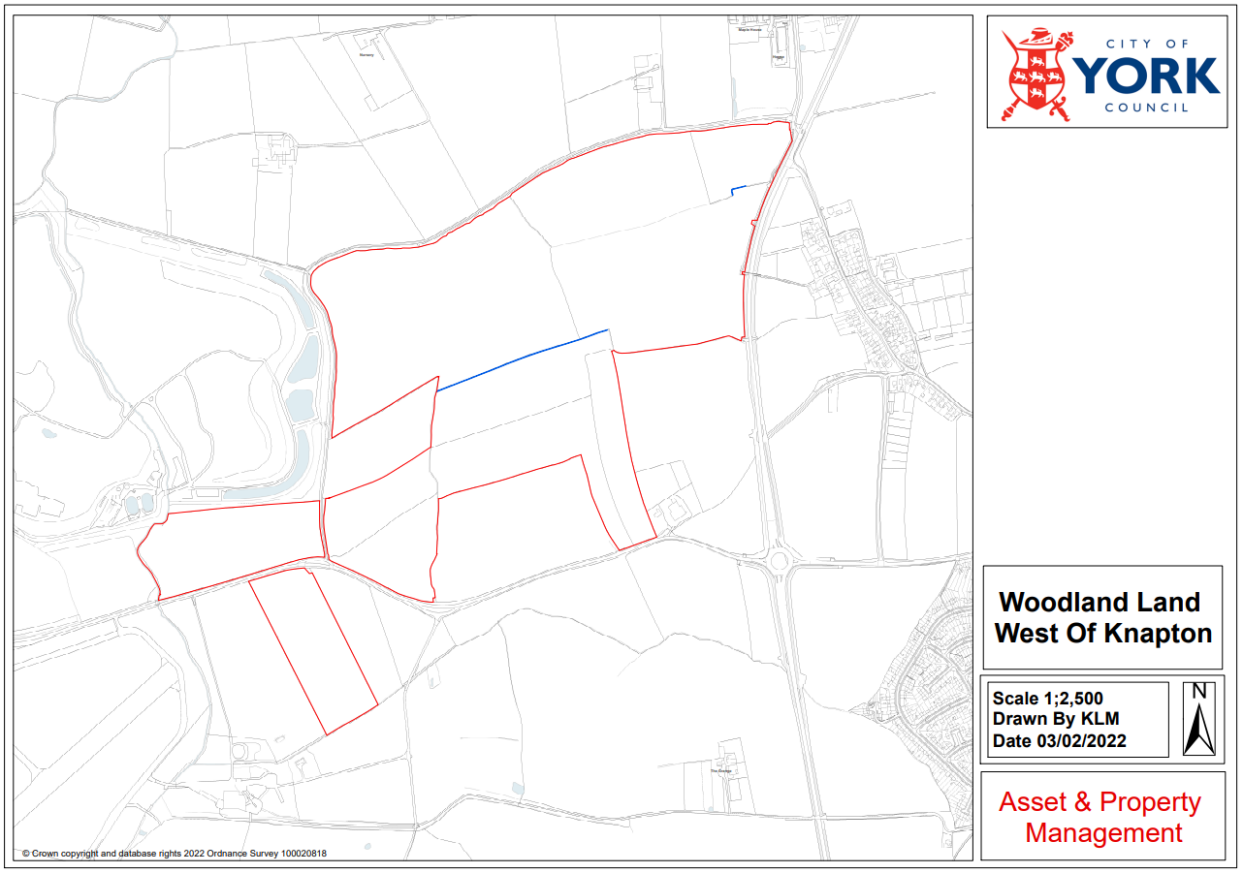


Figure 1. York Community Woodland Landholding

Section 2: Partnership Aims and Objectives

2.1 York Community Woodland Joint Vision Statement

The new woodland will be a well-designed, bio-diverse, green space providing a place for peaceful contemplation and leisure for the people of York. This will create a new stray for the city, support the climate change ambition, enhance the setting of the city and make York an even greater place to live, work and visit.[1]

2.2 Joint Objectives

The joint objectives for the site, as set out in the Project Management Plan, are:

- Achieve a sustainable, uneven-age structured mixed woodland during the lifetime of the Lease which meets or exceeds UKFS and UKWAS standards
- A demonstrable increase in biodiversity and natural capital
- Effective carbon sequestration
- Increase and enhance access to green space for local residents, thereby contributing to improved health and wellbeing
- Provide opportunities for green skills development, volunteering and nature-based learning
- Use and management of plastics on site in accordance with York Community Woodland Plastics Strategy as contained within the Lease.

These joint objectives will be measured using Key Performance Indicators. Appropriate KPIs will be adopted for the Woodland Establishment, management, and any future developments. KPIs will be reported annually to the Project Board.

The Council and Forestry England have joint accountability for developing the Woodland Creation plan, with Forestry England having sole responsibility for woodland delivery and management.

Each Partner commits to:

- Attend and input to partnership meetings relevant to their role (see Section 3)
- Jointly guide the role and activities of the project managers during the woodland establishment phase
- Prevent and, where necessary, resolve by agreement problems that arise (Section 4).

Section 3: Partner Responsibilities

The development of YCW may be described in three high-level stages: Woodland Establishment, Ongoing Management and Future Potential Development. Each Partner's roles will look different in each phase. The following section sets out the phase definition, partner responsibilities, and governance.

3.1 Woodland Establishment

Phase Definition

The Woodland Establishment phase is a discrete period for the planning and delivery of the YCW project. It encompasses project planning, gaining appropriate approvals, establishing the trees on the Site, and delivering the infrastructure set out in the Operations Phasing Plan (Figure 2).

Responsibilities

Forestry England is responsible for the delivery of YCW following the Woodland Creation Plan. The Woodland Creation Plan is the final design annexed to the approved Environmental Impact Assessment (may undergo minor amendments subject to the agreement of both Partners), and the description of the woodland for its creation. The Woodland Creation plan will be UKFS (United Kingdom Forestry Standard being the reference standard for sustainable forest management in the UK) compliant. The Woodland Creation Plan will cover the first 15-20 years of site operation, beginning from the date establishment works (Woodland Establishment Phase - initial 2 to 3 years) begin on the Site.

Forestry England Woodland Creation Team will finalise, obtain and comply with/satisfy all regulatory requirements for the implementation of the Woodland Creation Plan including completion of an Environmental Impact Assessment (Afforestation) and any necessary Planning Permissions (Town and Country Planning Act). This work will build on the land character, ecological and heritage assessments and successful Woodland Creation Planning Grant outputs and the Pegasus Planning Ltd woodland design masterplan agreed by the Council's Executive in August/September 2021.

The elements shown on the Woodland Creation Plan (see Appendix 2) will be funded by Forestry England through the Nature for Climate Fund. Any elements not shown on this plan, such as visitor centre facilities, toilets, or highway access alterations, are not eligible for this funding. Securing funding for additional features will be subject to an options appraisal, full business case (as per the Investment Programme procedures), and approval from the Forestry England Investment Sub-Group (see Section 3.3 for mechanism).

An indicative flow chart (Figure 3) summarises the steps to plan and deliver the site. Forestry England joined the process as the delivery partner at the final design plan stage and will deliver remaining tasks in the process, consulting the Council on the development of designs. The Operations Phasing Plan (Figure 2), developed collaboratively by the Partners, shows what Forestry England will deliver, where, and when. The Project Management Plan provides detail on project scope, objectives, key performance indicators, and milestones.

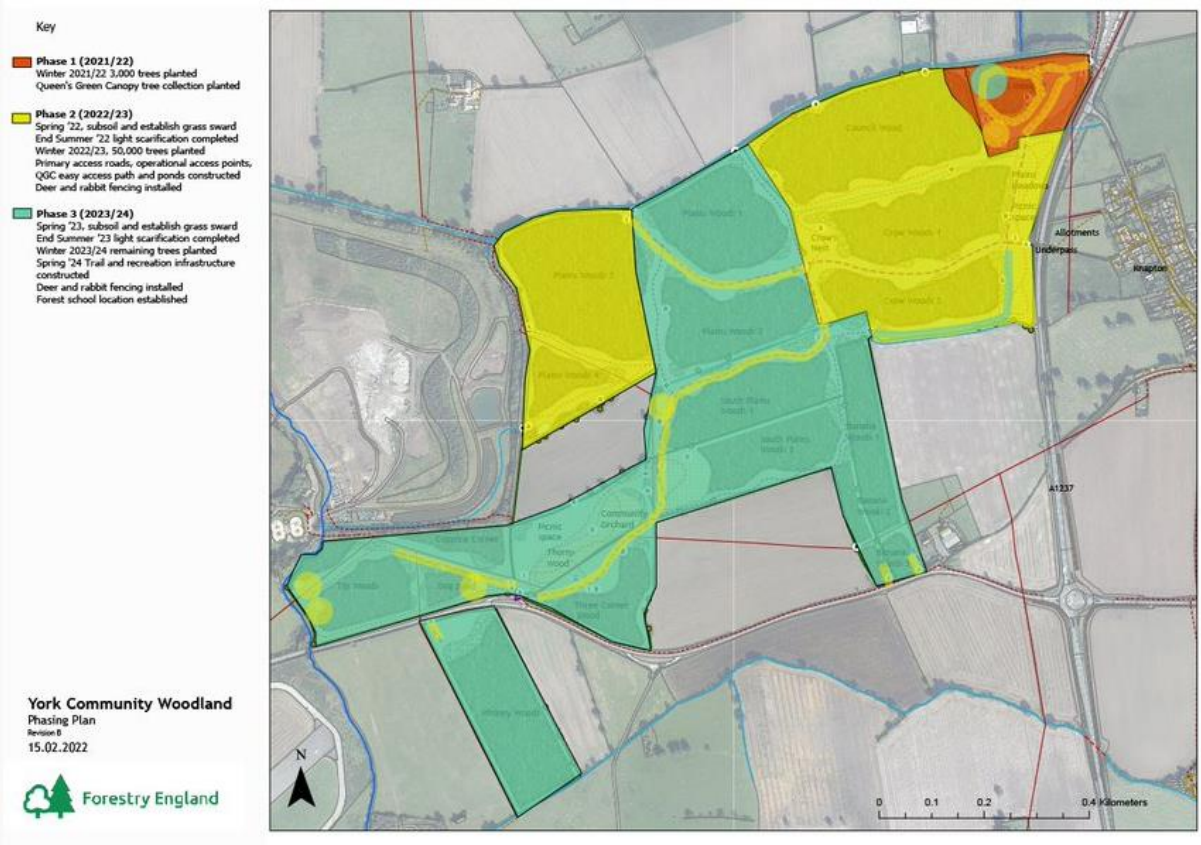


Figure 2. Operations Phasing Plan

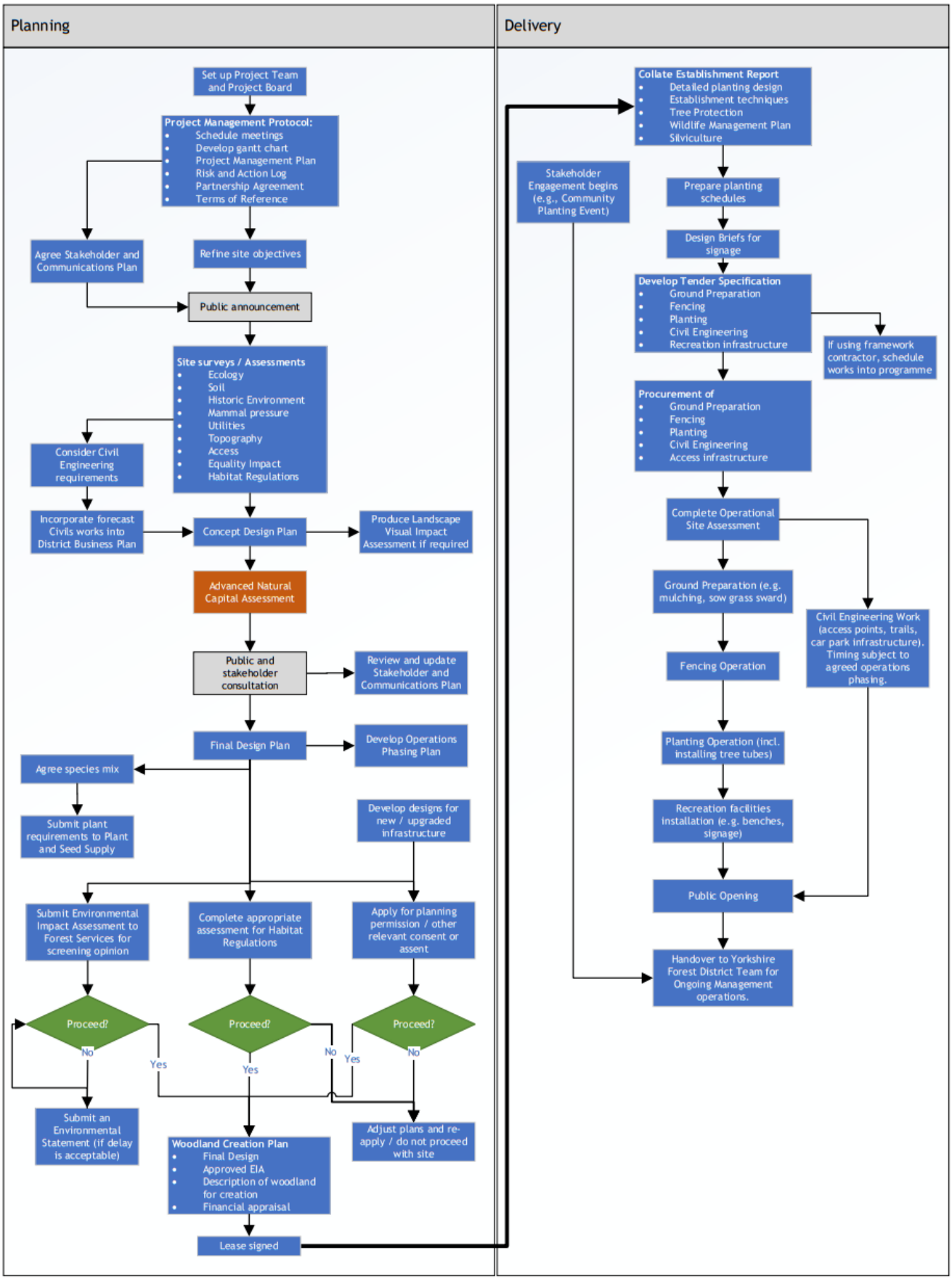


Figure 3. Planning and delivery phases of the York Community Woodland.

Governance

The Lease (lease clause 3.24) obliges Forestry England (in its capacity as tenant) to *'establish a management group to deal with the creation and future ongoing management/operation of the woodland and its associated facilities. The Tenant/such management group will consult and consider the views of the Council (Executive Member for Environment and Climate Change) and the local community in relation to the creation and operation of the woodland.'*

A governance structure (Figure 4 and Figure 5) has been developed which ensures that both Partners are involved in the strategic and operational decisions and that relevant groups are consulted. This governance structure is specifically designed for the Woodland Establishment Phase. Once all capital items have been delivered in accordance with the Woodland Creation Plan, the project governance will stop and ongoing management governance (as more particularly described in Section 3.2 below) will begin. During the Woodland Establishment Phase, the meeting frequency and roles represented may be altered as appropriate and subject to agreement by both Partners.

Governance Structure for Woodland Establishment Phase

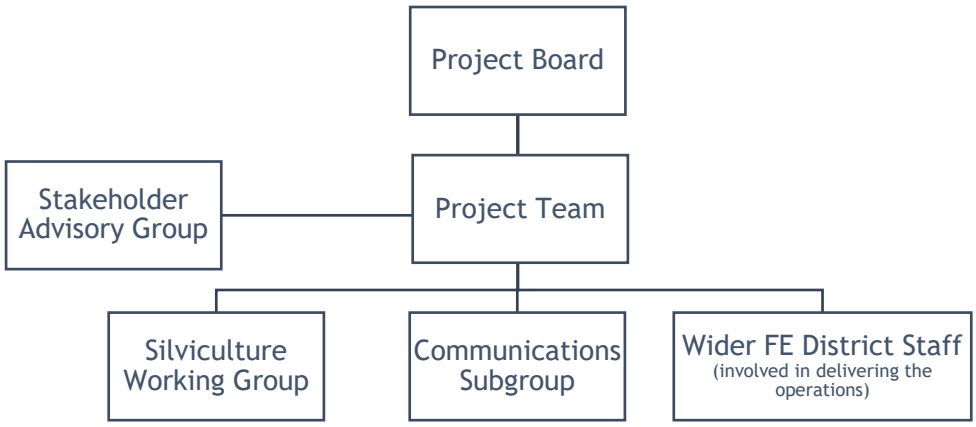


Figure 4. Governance structure for YCW establishment phase.

The Project Team will report to the Project Board via the following channels:

Project dashboard	To provide regular overview updates on the project progress, including risk levels and critical tasks.
Project Board Agenda Items	In the Woodland Establishment Phase, the Project Team will have sight of any key decisions being presented to the Project Board. This provides greater transparency and communication between the Project Board and Project Team.
Submit / present papers at Project Board meeting	To seek approval for high level strategic items (e.g. management plans, design plan, communications strategy).

Direct contact	Project Managers may escalate urgent issues, which they cannot resolve or need advice on. Ensure the rest of Project Team is made aware.

The Project Subgroups and Wider Forestry England District Staff will report to the Project Team via the following channels:

Action Log	To provide regular overview updates on the subgroup progress, including risk levels and critical tasks. An action log has been developed which contains information from the project team and subgroup meetings. The project managers will monitor the action log for any relevant progress updates.
Attendance at Project Team meeting	To contribute to site planning. To consult / seek approval for proposed method of delivering a task (e.g. Wildlife Management plan, community planting day event).
Direct contact	Subgroup leads may escalate urgent issues, which they cannot resolve or need advice on. Ensure the rest of subgroup team is made aware.

Figure 5. Woodland Establishment Phase Project Governance				
Project Group	Roles Represented	Responsibilities	Information Sharing	Frequency
Project Board	CYC • Executive Member for Environment and Climate Change • Head of Carbon Reduction • Head of Property • York Community Woodland Project Manager (while in post – June 2023) • Other Councillors consulted, where appropriate FE • Head of Woodland Creation (Chair) • Head of Planning and Operations • Forest Management Director, Yorkshire • Business Support Officer (Minute Taker)	• Responsible for the delivery of the project. • Provide leadership for the project, ensuring that the project delivers the required benefits and meets the success criteria. • Monitor project progress towards successful delivery of the required benefits, providing the delivery team with the direction, decision making and external support required for the project team to deliver the project.	All project documentation will be stored on the Forestry England Woodland Creation Team SharePoint. Key documents, agendas, minutes are shared with City of York Council via MS Teams channel or email.	Monthly
Project Team	CYC • York Community Woodland Project Manager • Woodland Engagement Manager FE Woodland Creation Team • Head of Planning and Operations (Chair) • Landscape Architect • Business Support Officer (Minute Taker) FE District Team • Head of Civil Engineering • Beat Forester • Ecologist • Funding and Development Manager / Communications and Marketing Manager • Land Agent • Head of Planning and Environment	• Contribute technical expertise and experience to deliver agreed objectives and deliverables. • Responsible for delivering the work packages / actions. Chair is responsible for delegating work packages and tracking actions. • Identify risks to project delivery and consider mitigation actions. • Escalate issues to Project Board. • Provide updates to Project Board on progress and consult Board for decision-making support and approvals.		Fortnightly
Comms Subgroup	CYC • Woodland Engagement Manager (while in post – June 2022) • Communications Manager (Sustainable Transport and Climate Change) FE • Head of Planning and Operations (Chair) • Funding and Development Manager • Beat Forester	Same responsibilities as Project Team but in relation to communications strategy and stakeholder management planning.		As required
Silviculture Working Group	• Beat Forester (Chair • District Forester (Operations) • Wildlife Manager	• Contribute technical expertise to deliver silvicultural management. • Responsible for delivering the work packages. • Provide updates to Project Team on progress / risk and consult for required approvals.		As required

3.2 Ongoing Management

Phase Definition

The Ongoing Management Phase describes the transition from a project with a discrete end point to the on-going, repeated, more standard ways of working on the Site. For the purposes of this Partnership Agreement, the ongoing management phase begins once all capital items have been delivered in accordance with the Woodland Creation Plan i.e., all trees are planted, infrastructure constructed, and the Site has been formally opened to the public. At this point, project governance outlined in Section 3.1 ceases and Ongoing Management governance will be implemented.

Responsibilities

The ongoing management operations will be managed by the Forestry England Yorkshire Forest District.

Forestry England Yorkshire Forest District will manage YCW according to the Woodland Creation Plan (initial ~15-20 years) and subsequently the Forest Plan (which has the meaning given to that expression in the Lease). A Forest Plan will be introduced in advance of felling operations as the Forest Plan provides regulatory approval.

The Forest Plan provides a description of the woodland as it is now; outlines the main points considered when deciding what is best for the woodland; describes how the woodland will develop over time and gives specific information about approved tree felling, replanting and regeneration over each 10-year renewal period. The Council will be consulted, and approve, the development and reviews of the York Community Woodland Forest Plan. All Forest Plans are reviewed by the Government's forestry regulatory body, Forest Services, and are open for public consultation.

Forestry England operations are completed according to standard Forestry England Policy, Procedure and Guidance (PPGs) documents and are audited against the UK Woodland Assurance Standard which ensures that our operations are FSC (Forest Steward Council) and PEFC (Programme for the Endorsement of Forest Certification) compliant.

Figure 6 seeks to communicate how the woodland may develop over the ongoing management phase, and the typical types of operations Forestry England will carry out. However, this is not an exhaustive list. Forest development is dependent on the species mixture and site conditions (e.g., soil types, mammal pressure). The stage descriptions below are therefore indicative of the potential overall character of YCW as it develops.

Figure 6. Indicative woodland development and typical operations			
Years since establishment (approx.)	Woodland type	Description	Typical operations
0-3 years	Establishment	Saplings (10-20cm) planted across the site and fenced / tubed. In this initial stage, the site will continue to look like an open landscape, criss-crossed with fences and tree shelters.	**Ground preparation** (e.g., scarification, grass sward establishment). **Initial tree planting.** **Tree protection** and repairs to fencing. **Wildlife Management** according to agreed plan, including use of lethal control. **Installation of key infrastructure** – see Operations Phasing Plan (Figure 2).
3-15 years	Woodland maintenance	Consolidation of woodland establishment.	**'Beat-up'** planting to replace any trees which have not established well. **Tree protection** and repairs to fencing. **Wildlife Management** according to agreed plan, including use of lethal control. Maintenance of key infrastructure.
10-20 years	Young Woodland	Young trees have established and may be anywhere between 5 – 10m in height, depending on species.	Once trees have reached a height where they will be more resilient to mammal browsing, fencing may be removed. This is subject to monitoring of impact of mammal damage. **Wildlife Management** according to the YCW Wildlife Management and Protection Plan, including use of lethal control. May **coppice** some areas towards the end of this phase to encourage trees to produce multiple stems. Lower-level coppice growth combined with mature trees will provide woodland structural diversity which creates a variety of habitats. The coppice process can be repeated every 12-20 years. Regular **inspections** and maintenance of infrastructure. According to Forestry England Managing Recreation Facilities policy, assets have planned inspection schedules according to infrastructure type and level of use. For trails and car park, there will be 3 operational inspections per year carried out by Yorkshire Forest District team.
20-40 years	Early Mature Woodland	Woodland landscape character and trees at heights of between 10 – 15m. Woodland blocks bordered with shrub planting	**Thinning / felling operations** begin usually on a 10-year cycle in accordance with the Forest Plan. Thinning reduces the canopy density and lets more light to forest floor. Opportunity for natural regeneration (new trees

		and grassy edges to create a natural graded transition.	develop from seeds that fall and germinate in situ). This leads to an 'uneven aged stand structure' where there is a combination of different aged trees, creating structural and habitat diversity. Planting a variety of different species will also create this structural diversity. **Dangerous tree inspections** and removal operations. **Wildlife Management** according to the YCW Wildlife Management and Protection Plan, including use of lethal control. **Inspections and maintenance** of infrastructure. Forest roads and surfaced trails may require resurfacing.
>40 years	Mature Woodland	Woodland is managed on regular thinning cycle (areas thinned every 10-15 years). Some areas will not be managed on this rotation (e.g. Queen's Green Canopy). Un-thinned areas will develop high tree crowns providing shade and less regrowth underneath.	As above. Managed in accordance with Forest Plan.

Governance

In the Ongoing Management phase, Forestry England Yorkshire Forest District will manage the Site in accordance with the Lease and Forestry England policies and procedures. The Project Team and Project Board will no longer be required. The Council will be consulted on decisions as required by the Lease (including obtaining any necessary consent from the Council as landlord for any alterations that Forestry England wish to make to the Site that require landlord consent pursuant to clause 3.8 of the Lease)

Forestry England Yorkshire Forest District representatives will meet with Council representatives annually to provide an update on site operations and progress.

The annual Partnership Meeting will have the following core items on a standing agenda:

- Update on site operations, opportunities, and challenges
- Review of Woodland Creation Plan (until replaced by Forest Plan)
- Progress against KPIs and milestones
- Review of Partnership Agreement
- Review of Project Management Plan
- Future development opportunities scoping and delivery
- Financial reporting

3.3 Future Potential Development

Description

Clause 3.8 of the Lease sets out the terms for making alterations or additions to the Site/Premises. The following section in the Partnership Agreement sets out future shared aspirations between the Partners but is not legally binding, and therefore the terms of the Lease shall take precedence. Responsibilities and exact governance are not defined in the Partnership Agreement as this will be subject to the type of project to be undertaken.

Visitor Offer

There is the aspiration from both Parties to deliver additional infrastructure, including a visitor centre style facility and associated car park, to enhance the visitor offer, as shown in Figure 7. The Project Board will meet in April 2024, following site opening, to discuss a programme for future developments.

The visitor centre, associated car park, access and highways enabling works to serve this, play and boardwalks will form later development phases of YCW which will be subject to the assessment and approval of Forestry England's Investment Programme. The Nature for Climate Fund does not cover developments beyond woodland creation and therefore further funding sources would be required for such future projects.

To secure approval and funding for additional infrastructure, the project would need to adhere to the policies set out by the Forestry England Project Management Office following the HM Treasury's 5 Case Model and 3 Stage Business Case methodology for the preparation of all business cases. For some more standard projects that are low cost and risk, a single business justification case stage can be used although its detail is proportionate to the size, cost or complexity.

Each Business Case contains the 5-case model which sets out the metrics against which the proposal will be evaluated. The Partners should consider future capital investments with these criteria in mind.

The Strategic Case	• How does the proposal deliver strategic objectives for the site? • Use site data (e.g., visitor numbers, visitor feedback, observations from district team) to inform case for change
The Economic Case	• Value for money • Appraisal of the realistic options • Identify preferred option
The Commercial Case	• Commercially viable • Procurement needs • Payment mechanisms
The Financial Case	• Financial appraisal including affordability, return on investment, pay back period, internal rate of return.

	• Funding source and any funding gaps
The Management Case	• Delivered successfully • Plans for project delivery (management plan, programme, risk register, benefits realisation, monitoring) • Governance and management arrangements

The business cases would be developed collaboratively by Yorkshire Forest District and City of York Council for approval by the Forestry England Investment Sub-Group (ISG).

Woodland Expansion

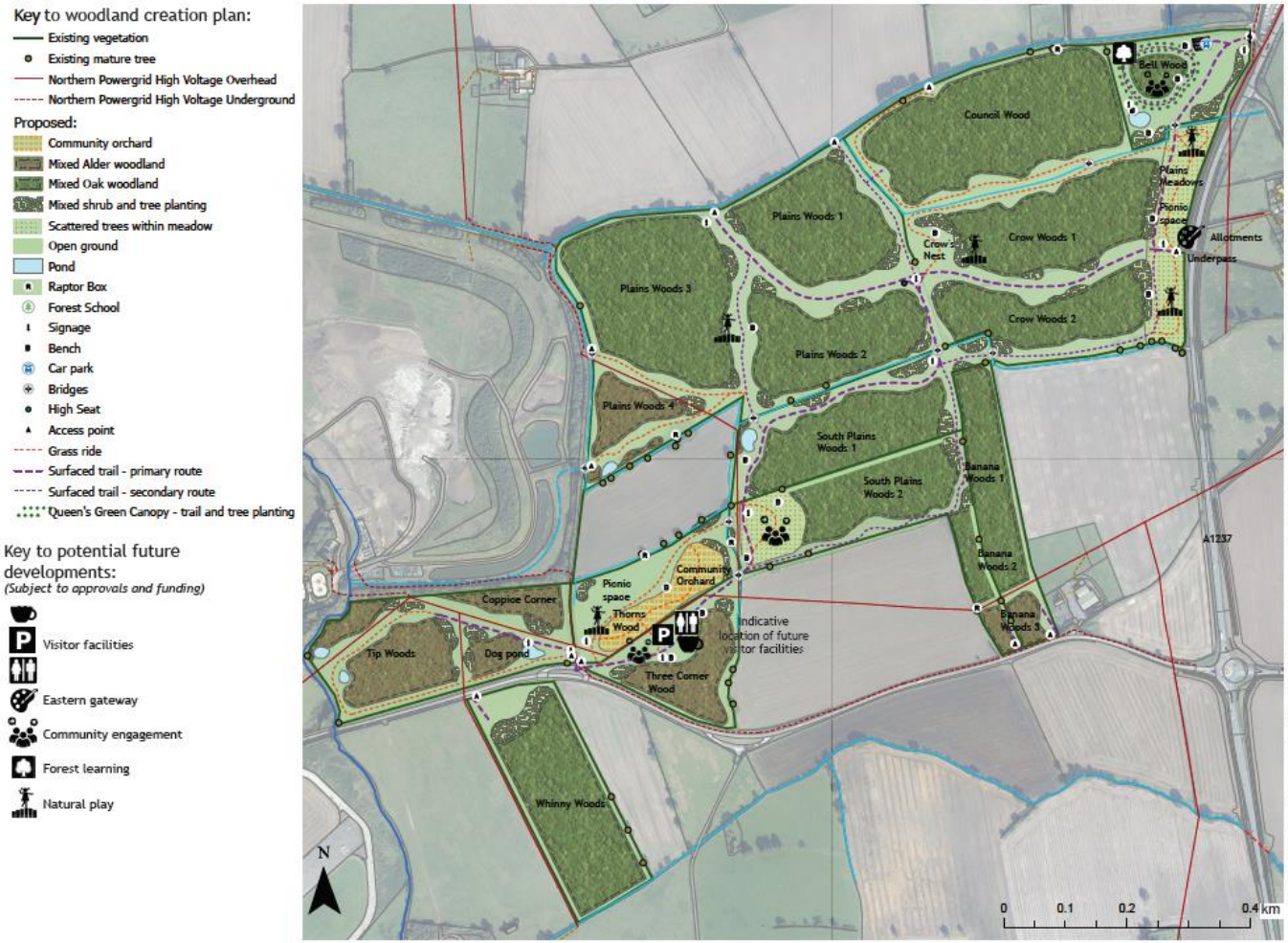
Opportunities may arise for woodland expansion in the future. If areas of Council land become available, both Partners will consider the options and implications of expanding the woodland area. The Council and Forestry England should consider these opportunities based on a thorough options analysis, financial appraisal, consultation, and subject to appropriate approvals.

Forestry England

CITY OF YORK COUNCIL

York Community Woodland Potential Development Plan

The following plan sets out Forestry England and City of York Council's future vision for York Community Woodland



Potential future developments:

Visitor facilities
Future visitor facilities may include new vehicle access off B1224, with car parking and a visitor hub: cafe and toilet facilities (subject to approvals and funding).

Eastern gateway
Potential for woodland themed community mural in Knapton underpass creating a new gateway to the eastern entrance to York Community Woodland.

Natural play
Across York Community Woodland a number of informal natural play features may be established encouraging playful exploration of the site and engagement with nature.

Community engagement
Continued community engagement will see York Community Woodland thrive and may include: volunteer tree planting and vegetation management; group fitness activities.

Forest learning
Forest school location may be formalised with the addition of a built shelter where associated practitioner-led activities can take place.

Forestry England

York Community Woodland
Potential Development Plan
May 2022

Figure 7. Potential Development Plan (10.06.22)

Section 4: Decision Making and Negotiations

4.1 Decision Making

This section sets out a high-level decision-making framework.

Responsible - The person/group who is assigned to do the work; also responsible for researching options and risks and making recommendations.

Accountable - The person/group who makes the final decision and has ultimate ownership. This is the last person to review the task before it is deemed complete.

Consulted - The person/group who must be consulted before a decision or action is taken. Usually given to the person who is sought out for advice on a task. This person is typically someone with knowledge or expertise on a specific subject matter.

Informed- The person/group who must be informed that a decision or action has been taken. Assigned to anyone who must be provided with updates on the progress of a task.

FE District - Forestry England Yorkshire Forest District staff who will be involved in the delivery of the site and managing the ongoing management operations after the establishment.

Stakeholder Group – expert stakeholder groups, local interest groups and representatives of local residents who have an interest in the project or will be affected by it. The Stakeholder Group was set up to consult on the development of the Woodland Creation Plan. Forestry England will continue to run this group for the duration of the Woodland Establishment Phase and subsequently consult this group to determine how the group will operate moving forward.

Project Team / Project Board - the Project Team and Project Board are groups set up in the Woodland Establishment phase and have Council and Forestry England representatives (Section 3.1). Where reference is made to the Project Team and Project Board, this is only relevant for the Woodland Establishment phase. In the Ongoing Management phase, the project management structure is no longer applicable.

Figure 8. Decision-making matrix. **Brackets denote parties involved in Woodland Establishment phase only.*					
Decision Category	Description	Responsible	Accountable	Consulted	Informed
Delivery Timescales	Decisions which impact when non-critical or BAU tasks are carried out.	(Project Team) FE District	(Project Manager)		
	Decisions which may lead to delay in critical tasks (implication for meeting delivery deadline).	(Project Team) FE District			(Project Board)
Woodland Creation Plan / Forest Plan	Significant changes to the design plan / content of the approved EIA	(Project Team) FE District	(Project Board)	(Stakeholder Group) CYC	
Key Management Plans	Project Management Plan, Wildlife Management Plan, Communications and Engagement Plan	(Project Team) FE District	(Project Board)		
Establishment and Ongoing Operations	Decisions related to standard operations for establishment and on-going management of site e.g., ground prep, planting, beat up surveys, trail repairs, dangerous tree work.	FE District			Site visitors
External Communications	Production and public release of high-profile communication material e.g., press release, stakeholder presentations on contentious issues	(Comms Subgroup) FE District	(Project Board) FE and CYC	External comms FE	
	Production and release of low-profile communication material e.g., social media posts, website updates, operational notices, signage	(Comms Subgroup) FE District			
Permissions	Approval for permissions for events / activities held on the landholding.	FE District			
Site closure	Decision on part site closure e.g., localised operations	FE District		(Project Team)	CYC, Site visitors
	Decision on whole site temporary closures e.g., site-wide operations, H&S	FE District		(Project Team)	CYC, Site visitors

4.2 Negotiations and Dispute Resolution

Notwithstanding the existence of the Lease (and the Partners' mutual acknowledgement that the provisions of the Lease will take precedence in the event of any conflict between the provisions of the Lease and the terms of this Partnership Agreement), this Partnership Agreement should be the initial reference point for negotiations with the aim to reach agreement and avoid disputes escalating.

Escalation of disputes should be avoided if possible. Therefore, both Partners agree to:

- Raise issues for concern at the earliest possible opportunity
- Work together to attempt to resolve issues at the earliest possible stage
- Seek mutually acceptable solutions through joint management meetings.

In the event that there is a disagreement that cannot be resolved by informal negotiations, the Partners may raise a formal dispute in accordance with the Lease.

Section 5: Monitoring

The Key Performance Indicators (KPIs) will help monitor the management of the Site against objectives. Appropriate KPIs will be adopted for the establishment of the woodland on the Site, business-as-usual and any future developments. Initial KPIs are set out in the Project Management Plan (Appendix 2). Tree planting targets are subject to break clauses in the Lease. The other KPIs are a management tool for the benefit of both partners.

During the Woodland Establishment phase, the Project Board should have oversight of the KPIs and ensure that the data required is being gathered to monitor progress. During the Ongoing Management Phase, Yorkshire Forest District monitor these measures and will provide updates via the agreed annual partnership meetings.

If there are persistent issues where KPIs are not being met, the Partnership will be responsible for identifying and delivering actions to mitigate or resolve the issue.

Appendix 1: Partner Contact Details

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Appendix 2: Supplementary Documents

Woodland Creation Plan
Project Management Plan York Community Woodland
York Community Woodland Plastics Policy
York Community Woodland Wildlife Management and Protection Plan
York Community Woodland Communication and Engagement Principles
Sustainable Transport Plan (in draft)

Forestry England's York Plastic Policy

Forestry England are committed to minimising the use of plastics in the creation of York Community Woodland. Tree shelters and guards are an essential means of establishing broadleaved trees, providing protection from browsing mammals and enhancing tree growth. Tree shelters and guards can be made from a wide range of materials. To date, most have been made from plastics which are not biodegradable. More recent designs use plant-based sources, compressed paper or cardboard however there are currently issues over their longevity as they need to be designed and constructed to provide adequate protection throughout the establishment of the tree. Further field-based trials and research are required before non-plastic alternatives are proven viable to use on a large-scale. Forestry England will host a field experiment at York Community Woodland in partnership with Forest Research as part of a UK wide network of research trials to determine the practicality, durability and efficacy of non-plastic biodegradable tree shelters produced by independent manufacturers as alternatives to those made from conventional plastics. An assessment of likely environmental impact and degradation end points will be conducted as well as their costs and practicality. The output will be in the form of a report which will be shared with City of York Council and inform Forestry England's approach to tree protection on woodland creation sites, including any future opportunities in York arising from Forestry England and City of York Council's partnership. The trial will be subject to material supply.

Forestry England will minimise the use of plastic tree shelters by following Forestry Commission Best Practice Guidance on the use of tree shelters and guards. This guidance sets out a framework which poses several questions to determine what form of protection is needed for successful tree establishment, with the primary aim of avoiding or reducing the use of plastic. An important consideration is the level of damage that mammals are likely to pose, and legal culling should be the primary method of protecting trees from damage by reducing deer populations to sustainable levels. Forestry England will conduct a baseline survey to understand current mammal populations and their likely increase following woodland creation, to inform the exact forms of protection required. It is expected that the majority of trees at York Community Woodland will be rabbit or deer fenced except where the size of woodland blocks or scattered planting renders this economically unviable. In these circumstances, tree shelters or guards will be required to enable successful establishment. Forestry England will use at least 1000 NexGen tree shelters made of cashew nutshell resin, castor oil and British wool in the creation of York Community Woodland, subject to supply. Early testing of this product by Forestry England has shown promising results and the product should be fully biodegradable, although volume production is unlikely to start until late 2022. Any plastic tree shelters or guards will be removed from trees following their successful establishment and recycled, along with plastic planting bags. Yorkshire Forest District currently work with Agricycle to recycle plastic who issue a Waste Transfer Note, which documents the transfer of waste from one person to another and evidences it has been recycled. Forestry England are certified by the UK Woodland Assurance Standard of which preparing and implementing a plan to remove redundant plastic material is a mandatory requirement for woodlands.

Forestry England supports the Forestry Plastics Working Group which aims to reduce plastics across the forestry sector. The Working Group majority funds a UK wide network of non-plastic tree shelter trials of which York would form an additional experiment and contribute towards this important research. Importantly, there are currently no formal research sites in Yorkshire nor new woodland creation sites, so York Community Woodland would contribute important data to the trial.

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Climate Emergency Policy and Scrutiny Committee **28 February 2023**

Report of the Assistant Director of Policy and Strategy
Portfolio of the Executive Member for Environment and Climate Change

Climate Change Strategy: Strengthening York's Resilience to Climate Change

Summary

1. In October 2021, the Council unanimously agreed to ask Executive to report on the city's climate resilience.

2. In December 2022, Council approved the Climate Change Strategy which sets out objectives to strengthen York's resilience to climate change, and in the same month, Executive approved the Climate Change Action Plan.

3. In preparation for climate change, the Yorkshire and Humber Climate Commission (YHCC) have launched the Climate Adaptation Programme. The Programme sets out how councils can prepare for the risks of adverse climate, with the expectation that activity takes place throughout 2023. This includes plans to undertake deeper council-wide climate risk assessment to further prevent and protect against future climate impacts.

4. One of the outcomes of the YHCC Programme will be the co-development of York's Climate Adaptation Strategy and Plan, for approval at a future Executive Member Decision.

Background

5. According to the World Resource Institute[i], global temperatures have so far risen by 1.1°C, and already the planet has seen an increase in natural disasters such as flooding, hurricanes, and other extreme natural events.

6. Working with the BBC, the Met Office created a visualisation tool that shares how increases in global temperatures will affect local

areas: What will climate change look like in your area? - BBC News. It predicted that York will see warmer wetter winters and drier hotter summers.

7. The [ii]Met Office has developed a list of expected impacts on urban areas, listed below:

- Heat: increased energy demand for cooling
- Health: increased health risks from heat stress
- Transport: increased disruption due to heat (for example: rail/road buckling)
- Drought: risk to water supplies
- Heavy rainfall: increased risk of river and surface water flooding
- Drainage: increased disruptions to drainage systems
- Energy: infrastructure at risk from over-heating or flooding
- Environment: risk to biodiversity (plants and animals)

8. In 2022, York experienced the hottest day ever recorded at 38°C. This exceeded estimates for the hottest summer day of 35.6°C if global average temperatures increase 2°C above pre-industrial levels, demonstrating the urgency of action.

9. Across Yorkshire and Humber unprecedented summer heatwaves had temperatures rising above 40°C. During the heatwaves, NYLRF managed regional risks in line with multi-agency incident management and the council stood up silver command. Issues at the time included fires in rural areas threatening isolated homes and farms, overhead electric cable disruption and road tarmac melting causing travel disruption.

10. During the July 2022 heatwave, West Offices suffered an electrical malfunction from overheating causing the sprinklers to activate leading to disruption of council services.

11. Increased frequency of adverse weather events as a result of the changing climate brings multiply impacts that every council service will need to be ready to address. To prepare for increases in global temperatures and the impact it brings locally and to council services requires a shift in how the council responds, whilst learning from the council's well-rehearsed response to flooding.

12. Adapting to climate risk is a feature of the CDP rating process and by having an Adaptation Strategy and Plan in place will contribute to the evidence to retain York's A rating.

Social impact

13. Public Health confirm that as a result rising temperatures, hospital admissions will rise from asthma and dehydration (particularly amongst the elderly/younger populations).

14. Higher temperatures lead to excess deaths, with 82 excess deaths per day reported across the UK as a result of the July 2022 heatwave. None were recorded in York.

15. With heatwaves typically in the summer months there is the risk that exams are disrupted, with temporary school closures or exam halls overheating.

16. The Cost of Living report at Executive in November 2022 details how rising energy costs and inflation is driving more of York's households into poverty. As more of York residents struggle to balance household income and expenditure, the ability for residents to respond to climate risk lessens.

Climate resilience risks for York

17. In response to the October 2021 Council motion *"Government Must Work with Councils to Tackle Worsening Heatwaves and Extreme Weather"*, the council has begun work to identify the most significant threats of climate risk to York.

18. Using the UK Climate Change Risk Assessment, a draft report is being prepared identifying key risks for York. The UK Climate Change Risk Assessment being considered are:

    (i) Risk to soils from changing climatic conditions, including seasonal aridity and wetness
    (ii) Risks to food safety and food security
    (iii) Risks to terrestrial species and habitats from changing climatic conditions and extreme events, including temperature change, water scarcity, wildfire, flooding, wind, and altered hydrology
    (iv) Opportunities from new species colonisations in terrestrial habitats

(v) Risks to people, communities and buildings from river and surface flooding

(vi) Risks to building fabric

19. Each of these risks are being explored further with impacts against York's economy, health, land, habitat loss, species loss, natural asset, and heritage specified for an anticipated 2°C warming by 2050.

20. In addition, a more detailed analysis is underway to understand wider risks, learning from the wider region and drawing on the Met Office urban climate change risks.

21. The draft report will be developed to reflect both the UK Climate Change Risk Assessment risks and the growing evidence base and good practice from across the region, including more information about the social and economic impacts on different resident and community groups, the impact on the council's workforce to operate in extreme temperatures and risks and issues identified by partner organisations.

22. In addition, the initial analysis took place before the heatwaves in 2022 and the predicted increase frequency of heatwaves in the future - it will also be updated to reflect these changing predictions.

23. When completed, the report will be shared with the Executive Member for consideration.

Climate resilience risks in York: flooding

24. York is already significantly ahead of adapting to the impact of increased river flooding. City of York Council is a lead local flood authority leading on the management of local flood risks.

25. A report about the 5-year multi-partner York and North Yorkshire Catchment Flood Management Project is included in **Annex A.** The project plans to better understand how land management upstream can affect flood risk downstream and aims to build a future legacy of 'natural flood management' in the catchment area.

26. To adapt and prepare for increased river flooding as a result of climate change, the council has made a significant commitment, working with the Environment Agency on the delivery of c£100m spent on defences and dedicated resource working at a local and regional level.

Yorkshire and Humber Climate Commission (YHCC) Adaptation Programme

27. In response to emerging climate risk and to strengthen regional climate resilience, YHCC has launched an adaptation programme that will run throughout 2023. It is being run as a pilot with learnings shared with LGA (**Annex B**)

28. The programme supports local authorities develop the strategies, plans, and actions to become more climate resilient, both across the area they serve and within the council itself. It is comprised of a pathway with work concluding in December 2023.

29. By working at a regional level, there is the opportunity to share expertise, reduce duplication and identify future funding opportunities.

30. By the end of the programme, York will have developed a Climate Adaption Strategy and Action Plan aiming at strengthening York's climate resilience and reflecting neighbouring authorities' own adaptation strategies and plans.

Strengthening York's climate resilience

31. The Climate Change Strategy sets out the below objectives to strengthen climate resilience:

    2.5 Make our buildings climate resilient – protect our built environment from potential flooding and overheating

    3.5 Futureproof the infrastructure – ensure our transport infrastructure can withstand extreme weather events

    5.4 Increase business resilience to climate risk – ensure businesses are not adversely affected by changing climate and identify new opportunities for growth

    6.4 Reduce the impacts of extreme weather events – use our natural environment to reduce risks and impacts of flooding and overheating

32. To respond to these objectives and prepare an Adaptation Strategy and Action Plan that reflects neighbouring authorities plans, the council will:

a. Update the draft Climate Risk report to understand the totality of risks, including lessons learned from across the region, the social impact, impact on the workforce together with risks and issues raised by partners – published in Spring 2023.

b. Work with region (through the YHCC Programme), city partners, and frontline services to develop an Adaptation Strategy – that builds on the work already underway to strengthen York's resilience to flooding.

c. Develop a costed Action Plan that explores both quick wins and longer term / systems change - with an accompanying equality impact assessment setting out how actions do not inadvertently disadvantage communities across the city.

33. The Executive member for Environment and Climate Change will be invited to approve the Climate Risk report, Adaptation Strategy and Action Plan. Approved adaptation actions will be added to the Climate Change Action Plan.

Contact Details

Author:	**Chief Officer Responsible for the report:**
Claire Foale Assistant Director Policy and Strategy	Ian Floyd, COO
	Report Approved √ **Date** 15/02/23

Wards Affected: **All** √

For further information please contact the author of the report

Background Papers:

Council October 2021 (Public Pack)Agenda Supplement Agenda Supplement for Council, 21/10/2021 18:30 (york.gov.uk) – item 6 (ii)

Council December 2022 Agenda for Council on Thursday, 15 December 2022, 6.30 pm (york.gov.uk) item 36

Executive November 2022
https://democracy.york.gov.uk/ieListDocuments.aspx?CId=733&MId=13292&Ver=4
item 47

Annexes

Annex A: York and North Yorkshire Catchment Flood Management Project
Annex B: Yorkshire and Humber Climate Commission Adaptation Programme

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[i] https://www.wri.org/climate
[ii] Effects of climate change - Met Office

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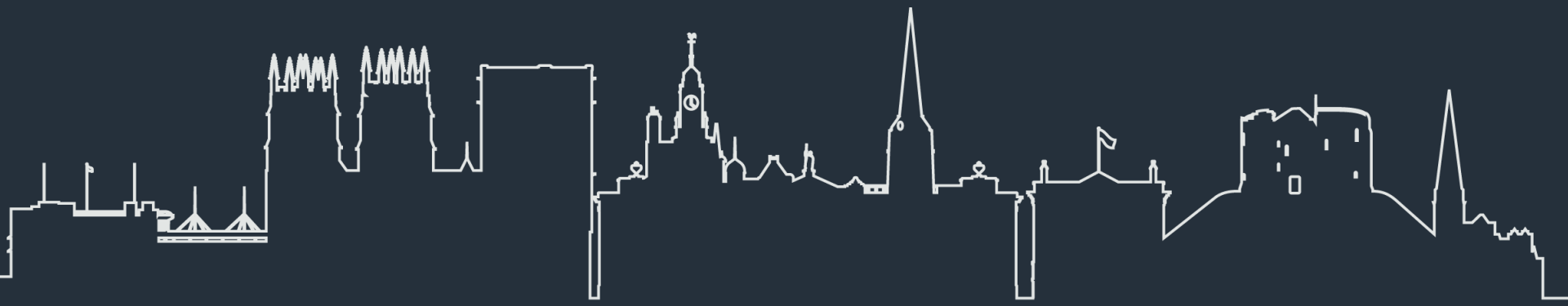
CITY OF YORK COUNCIL

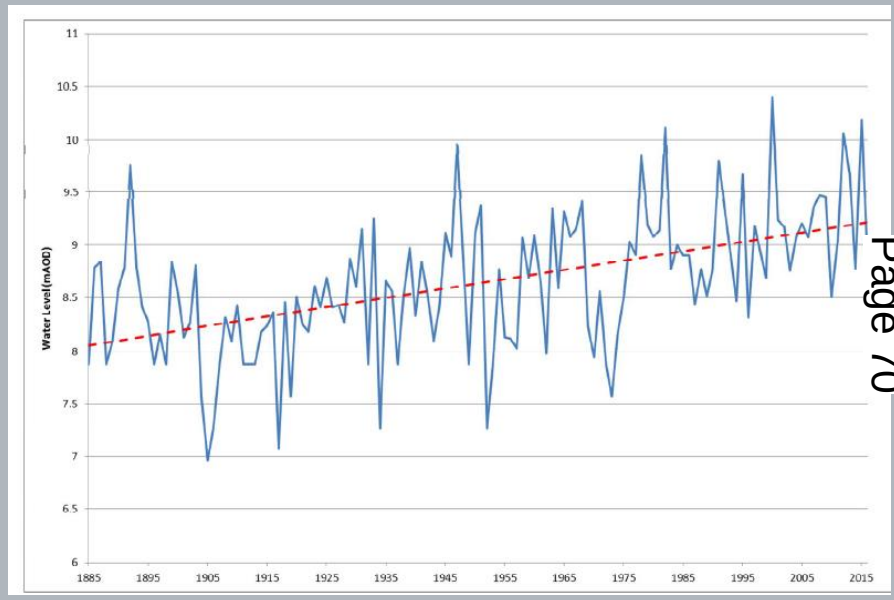
York and North Yorkshire Catchment Flood Management Project

Annex B



Context

- Rising river levels in York
  - Flood defences raised but risk of overtopping will increase
  - 3,500km^2 Swale, Ure and Nidd and Ouse catchment
- Farming subsidies/grants changing: ELMS



Working together to improve and make a difference

About the project

- York and North Yorkshire Catchment Flood Management
- Managed by: City of York Council (with NYCC)
  - Partners include
    - University of York, Yorkshire Dales Rivers Trust/Dales to Vales Rivers Network , Yorkshire Dales National Park, Nidderdale Area of Outstanding Natural Beauty, Natural England, Environment Agency, farmer networks, York and N Yorks Local Enterprise Partnership, Yorkshire Water, Yorkshire Wildlife Trust (and others)
  - Duration: 5 years (until 2027)
  - Funding: Up to £6m from the Government Flood and Coastal Risk Innovative Resilience Programme (EA administers)

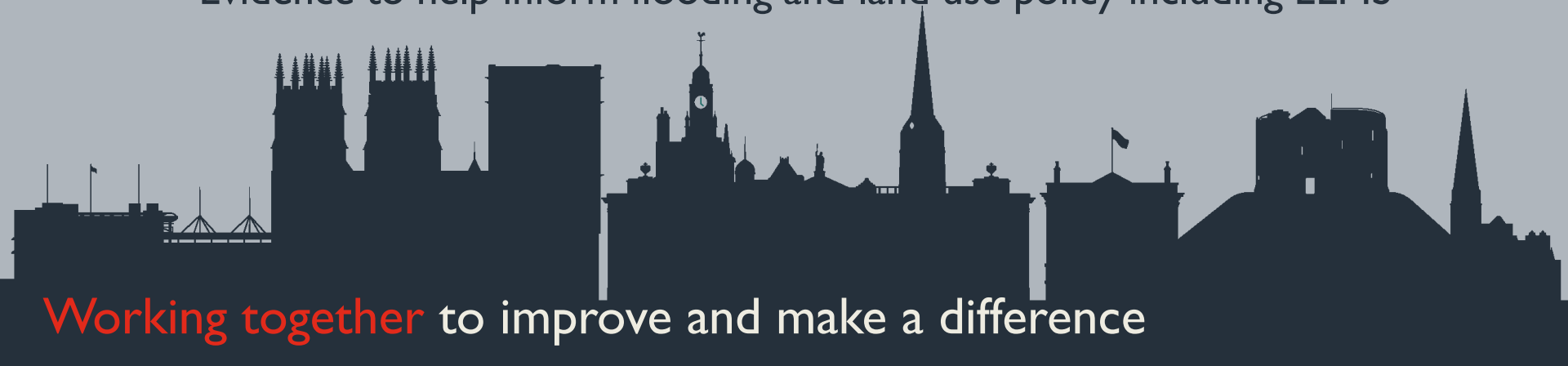
Working together to improve and make a difference

What the project will do

- The project will take an innovative approach to:
  - Better understand how land management changes in the catchment could affect flood risk downstream
  - Show how natural flood management can protect communities
  - Engage with communities throughout the catchment so they understand how they are linked by water
  - Build capacity and establish a future legacy of 'natural flood management' work in the catchment

Benefits

- Local benefits
  - Reduce flood risk to rural communities in North Yorkshire
  - Cumulatively, help downstream communities including York
  - Environmental benefits (water quality, biodiversity etc)
  - Support farmers and land managers through a time of change
  - Building flood management capacity in catchment organisations
- National benefits
  - Evidence to help inform flooding and land use policy including ELMS



Ambition

- Influence long-term direction for the catchment
  - Use evidence to influence catchment decisions
  - Understand funding opportunities
  - Take a collaborative approach: not top-down
  - Identify ways of working to support ongoing investment in catchment flood management
- Act as national exemplar

Further information

- For further information please contact
  - Steve Wragg
    - CYC Project Executive
    - steve.wragg@york.gov.uk

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Yorkshire and Humber Climate Commission Climate Adaptation Programme - Overview

Version 17/11/2022

Authors: Muriel Bonjean Stanton and Rosa Foster

Table of Contents

Introduction

This document gives an overview of the Yorkshire and Humber Climate Commission (YHCC) Climate Adaptation Programme, that is taking place from January to December 2023.

The need for the Programme was identified at the YHCC's Regional Policy Forum and the Programme was then designed based on the continuous exchange between the YHCC and the regional representatives (from LAs & CAs) in the YHCC Adaptation Programme Task and Finish Group.

The Programme aims to support Local Authorities (LAs) in the Yorkshire and Humber region to develop strategies, plans procedures, and actions to mainstream climate variability and change[1] in their organisations and ensure that the services they provide become more climate resilient. All the Local Authorities in the region have already developed some climate adaptation actions (e.g. flood resilience actions, development of a climate adaptation strategy, building climate literacy in the organisation, undertaking climate risk assessments etc.). This Programme aims to bring all the climate adaptation actions undertaken so far, and all the forthcoming adaptation efforts still needed, into a coherent and comprehensive framework. This framework will enable effective and efficient knowledge and experience transfer, helping all involved move to a comprehensive and similar position. All LAs involved welcome this opportunity and the support provided.

The Programme builds on the Local Partnership "Climate Adaptation Toolkit for Local Authorities" [2]. Following feedback from the task and finish group, we have put additional emphasis on:

- developing internal climate leadership (i.e. involving corporate leaders as well as climate officers and service leaders),
- establishing internal organisational processes early on (e.g. thinking about building Monitoring and Evaluation routines early on in the process), and
- allocating responsibilities for climate adaptation related actions throughout the Authority.

This is the first iteration of the YHCC Climate Adaptation Programme. In this pilot, 13 Local Authorities across the Yorkshire & Humber Region are taking part. The learnings from supporting these 13 Local Authorities will be used to strengthen the YHCC Climate Adaptation Programme so that this experience can be shared with other Local Authorities throughout the region and beyond. Alongside the running the Programme, the YHCC team will be working with the Local Partnerships team that developed the "Climate Adaptation Toolkit for Local Authorities" and the Local Government Association, in order to share learning and insights and seek additional support if necessary.

[1] Climate variability includes all the variations in the climate that last longer than individual weather events, whereas the term climate change only refers to those variations that persist for a longer period of time, typically decades or more.

[2] https://localpartnerships.org.uk/wp-content/uploads/2021/12/Local_Partnerships_Climate_Adaptation_Toolkit_v1.pdf ; Accessed 14/11/2022

Specifics of the YHCC Climate Adaptation Programme

The Programme fosters sharing and learning between the Local Authorities

At the core of this Programme are the exchanges Local Authorities in the region will have during the Programme "get together" sessions and the communications they will have between these sessions. Local Authorities that are a bit more experienced in one area will be encouraged to share their experiences (and ideally relevant resources that they have developed) with the other Local Authorities embarking on the Programme at the same time. The spirit of the programme is to share learning already within the region, accelerate climate action, and pool resources to plug gaps that are identified as we go through the process. This way a comprehensive and widely understood baseline will be established, from which further adaptation work can evolve.

Throughout the Programme, there will also be ample opportunities to share some of the workload across the Local Authorities to avoid some effort duplication (e.g. when developing the climate adaptation service plan, Local Authorities will be working in smaller groups and could chose to divide some of the foundation work necessary to get started). More importantly, by going through the Programme together, the participating Local Authorities will create strong relationships, ones that should, hopefully, carry on beyond the YHCC Climate Adaptation Programme and support cross sector & geographical learning and collaboration. The fact that we have such a great coverage of the region means that by working through the programme together, the Local Authorities are really supporting the climate resilience of the region as a whole and are further building regional leadership on climate adaptation.

The YHCC Secretariat team's Role

The YHCC Secretariat team's role in the running of the Programme sessions is primarily to foster and facilitate discussions on climate adaptation and peer-to-peer learning between Local Authorities. Where possible and appropriate, case studies or checklists will be provided to support the Local Authorities. The YHCC secretariat team will also be available throughout the process to answer specific questions arising from mainstreaming climate adaptation in the Local Authority and provide additional resources where needed.

The YHCC is hosting a series of Delivering Impact sessions from now until November 2023 which are all open to members of the Programme and a schedule will be provided in due course. These sessions will identify practical actions that can be taken across the region in order to establish or accelerate climate action. The Commission is using the sessions to focus on key issues such as addressing the cost-of-living crisis, promoting retrofit, strengthening adaptation planning, promoting green jobs and skills investment and creating the basis to develop a regional approach to land use. In every session, insights are drawn from leading national experts, policy and planning measures are explored and practical experiences from within the region are evaluated. Outputs from each session will propose practical next steps appropriate for the topic at hand.

The Programme recognises the specific needs of each Local Authority's adaptation journey

This Programme has been designed on the basis that the Authorities in the region are at different points in their climate adaptation journey. Some Authorities are just starting to develop their climate adaptation efforts, whilst others have already some adaptation strategies and procedures in place, and some have really quite robust approaches but are seeking confirmation and to achieve consistency across their services.

The end goal of the Programme is to ensure that the services Local Authorities are responsible for delivering become climate-resilient and that the Authorities have monitoring and evaluation procedures in place to ensure that services remain climate resilient as future climate impacts arrive and accelerate, as we anticipate they will. The Programme approach will make best use of the existing climate adaptation expertise and climate literacy that already exists within the Local Authority, and will strengthen it by identifying any gaps and supporting a consistent and systematic approach across services and the region.

We have designed the programme with pragmatism in mind. We fully recognise the challenges that LAs face at the moment with the Cost of Living Crisis, further budget pressures and ever increasing demand on already fragile services. However, whilst being pragmatic, it is critical that we do not lose sight of how we would ideally like things to be, given the scale and gravity of the climate emergency within which we find ourselves. This is what we must ultimately aim for.

A Tiered Approach

Therefore, we have created the Programme with a 3-Tier approach. Each of the Tiers represents the a "typical" progression on an adaptation journey. The actions to be ticked off for Tier 1 and Tier 2 organisations are similar. What differentiate these two Tiers is the level of efforts required. In Tier 1, most actions are new to the Local Authorities and so the learning curve is steepest. Whereas some of the actions are already completed or underway in Tier 2 Local Authorities, and so it is a case of revisiting, refreshing and finessing the approaches or plans. It is anticipated that Tier 2 Local Authorities will be able to build on their efforts they have already deployed whilst developing or furthering outstanding actions.

Tier 1 is the typical journey for these LA that are just starting with their climate adaptation efforts. Tier 1 is also, therefore, the "complete" journey from starting to think about climate adaptation within the Local Authority to all the LA services being climate resilient. It is the Tier that requires the most efforts (in human capacity, financial and time terms).

> Tier 1 Example: This Local Authority has already been exposed to extreme weather events and has had to navigate some of its consequences (e.g. flooding of roads or properties). This Local Authority knows that these extreme weather events are likely to become more frequent in the future and would like to be more prepared to navigate them to mediate the adverse consequences of such events or take advantage of the opportunities they might present. The Local Authority wants to mainstream climate adaptation throughout the organisation and ensure its services are climate resilient but has not really started to think about how to develop a coherent approach to do so.

Tier 2 is a typical adaptation journey for the LA that already has a climate adaptation strategy, plans or actions in place but needs to build on these efforts and extend them throughout the whole Local Authority whilst making sure the LA has a coherent approach to its climate adaptation efforts.

> Tier 2 Example: This Local Authority has already been exposed to extreme weather events and has had to navigate some of its consequences (e.g. flooding of roads or properties). This Local Authority has already taken some actions to embed climate adaptation in its organisation, for example building climate literacy into the organisation or developing an adaptation strategy. This Local Authority needs to build on these efforts and make sure existing and future actions to tackle Climate Variability and Change come together under a coherent approach to climate adaptation.

Tier 3 is a typical journey for the LA that already have mainstreamed climate adaptation across all their services. This work in this Tier is mainly focussed on regularly monitoring and evaluating climate adaptation procedures in place, ensuring that resilience is maintained through continual learning and adaptation.

> Tier 3 Example: This Local Authority has already embedded climate adaptation at all levels and across all services. It has a climate adaptation leadership team in place, a Climate Adaptation Strategy and all its services have a Service Climate Adaptation Plan. It also has some Monitoring and Evaluation procedures in place to monitor it adaptation efforts at all levels. This Local Authority is routinely monitoring it adaptation efforts and adjusting its Adaptation Strategy and Service Climate Adaptation plans and actions accordingly.

The progression of the LA can also be atypical. This might particularly be the case for the LA in Tier2; these LA that have started their adaptation efforts but might not have completed all the steps highlighted in Tier 1. In that case the LA will have to navigate between Tier 1 and 2 actions. The LA could be on Tier 2 for the Climate Adaptation Strategy they already developed but on Tier 1 for the Service Climate Adaptation Plans they are starting to develop. The Programme was designed with flexibility in mind, but all the "need to action" actions of Tier 1 need to have been completed.

A checklist of actions for each Tier will be provided before the sessions. The list of detailing the actions for each Tier can be seen in Appendix 1.

The Programme helps transcend political and staff changes in the Local Authorities

Climate adaptation measures and approaches require culture change and sustained focus. Therefore, they themselves need to be resilient to political changes and staff turnover within the organisation. Documenting each step of the adaptation journey (and producing a written output for each action) ensures that the Local Authority can rely on a climate adaptation audit trail as and when changes in political leadership or staffing occur. And, having strong and robust governance in place will also be instrumental to success over time.

An strong audit trail also enables the constant Monitoring and Evaluation efforts that are an essential aspect of any climate adaptation journey. More details on the type of output for each action can be seen in Appendix 1.

YHCC Climate Adaptation Programme sessions (outline, timeline, structure, and participants)

Preliminary briefings with each corporate lead of the participating Local Authorities have been taking place from mid-September 2022 to mid-November 2022. These briefings introduced the YHCC Secretariat leads for the programme and provide a short overview of the Programme as well as hearing about what climate adaptation efforts Local Authorities have been undertaking so far. It enabled the YHCC Secretariat leads to collate early feedback on the aims and outcomes sought from the Programme.

The Programme aims to involve designated Corporate Leads, Climate Support Officers and Service Leads at various stages of the Programme. **Table 1** provides a detailed overview of the Programme sessions (outline, timeline, structure and participants).

A preliminary session with the Corporate Leads on the 23/11/2022 and one with the Climate Supporting Officers on the week commencing 09/01/2023 (date to be confirmed) will take place. These primary sessions aim to introduce the Programme and discuss ways of working collaboratively going forward.

The Programme is anticipated to run from January to December 2023. Throughout the year several sessions will take place. There are ample opportunities for Local Authorities to shape the sessions. Before each session, a survey will be sent out to the Local Authorities to assess what knowledge/resources exist within the Local Authorities, what gaps need to be addressed and what topic need to be discussed in the forthcoming session. The session will be then planned based on the results of the survey. Two sessions (i.e. sessions 5 and 6) will be run as workshops. All sessions will have specific outputs and will require a concerted effort throughout from the participating Local Authorities.

***Table 1** : YHCC Climate Adaptation Programme session outline, timeline, structure and session participants*

Session number	Title	Who should attend			Provisional date (Week Commencing or w/c)	What will be covered (determined by pre-session survey)	Format of the session
		Corporate Leads	Climate Support Officers	Service Leads			
0	Launch session with all participating Local Authorities (LAs) CORPORATE LEADS	X			23/11/2022	1- Local Authority (LA) Corporate Leads introductions / YHCC introductions 2- why it is important for LA to adapt to climate variability and change - business case for climate adaptation in Local Authorities 3- Broad introduction to the YHCC Climate Adaptation Programme (inc. building climate adaptation leadership, Climate risks included in corporate risk register, importance of M&E, developing climate literacy in the LA) 4- Ways of working (Clarification of YHCC roles and support; LAs communicating with YHCC, LAs working together, LAs communicating with each other's) 5- Re-enforced commitment to working as a group and sharing experiences, ideas, resources etc.	Mix of presentations by YHCC and discussions Chaired by YHCC

Session number	Title	Who should attend			Provisional date (Week Commencing or w/c)	What will be covered (determined by pre-session survey)	Format of the session
		Corporate Leads	Climate Support Officers	Service Leads			
0	Launch session with all participating Local Authorities (LAs) CLIMATE SUPPORT OFFICERS		X		w/c 09/01/2023	1- Local Authority (LA) Climate Support Officers introductions / YHCC introductions 2- why it is important for LA to adapt to climate variability and change - business case for climate adaptation in Local Authorities 3- Broad introduction to the YHCC Climate Adaptation Programme (inc. building climate adaptation leadership, Climate risks included in corporate risk register, importance of M&E, developing climate literacy in the LA) 4- Ways of working (Clarification of YHCC roles and support; LAs communicating with YHCC, LAs working together, LAs communicating with each other, Climate support officers working with corporate leaders and service leaders) 5- Re-enforced commitment to working as a group and sharing experiences, ideas, resources etc.	Mix of presentations by YHCC and discussions Chaired by YHCC
1	Introduction to climate adaptation governance, climate adaptation schemes and the importance of M&E in adaptation efforts	X	X		w/c/ 23/01/2023	Overview of climate adaptation, policies, governance, motivation for adaptation etc (e.g. certification schemes (e.g. CDP…)). An introduction to monitoring and evaluation and why it is at the heart of adaptation.	YHCC answering the gaps in knowledge raised by the survey monkey. Facilitating sharing between Local Authorities (their insights or experiences, resources, documents etc)

Session number	Title	Who should attend			Provisional date (Week Commencing or w/c)	What will be covered (determined by pre-session survey)	Format of the session
		Corporate Leads	Climate Support Officers	Service Leads			
2	Developing a Climate Adaptation Strategy and first thought on a Monitoring and Evaluation Plan for the Strategy		X		w/c 6/03/2023	How to develop a Climate Adaptation Strategy and key points to think about to draft a Monitoring and Evaluation plan for the Strategy	YHCC answering the gaps in knowledge raised by the survey monkey. Facilitating sharing between Local Authorities (their insights or experiences, resources, documents etc)
3	Deciding the Services to focus on & Corporate Leads feedback & check in	X			w/c 27/03/2023	LA Corporate leads to feed back to YHCC about their corporate risk register reviews after climate risks included. Each corporate lead to put forward their most "climate vulnerable" services / the 3 top services they want to focus on. Allocation of LA to one working group (one service).	YHCC to facilitate sharing and discussions
4A	Developing a Climate Adaptation Service Plan (1/2) (each LA to focus on one service / 3 groups of LAs covering 3 services in total; the 3 services are agreed upon in Step 3))		X	X	w/c 24/04/2022	How to develop a Service Climate Adaptation Plan and key points to think about to draft a Monitoring and Evaluation plan for the Plans It is also a briefing to the LA service leads	YHCC answering the gaps in knowledge raised by the survey monkey. What resources LAs do not have access to, what are they missing to get started etc. Facilitating sharing between Local Authorities (their insights or experiences, resources, documents etc)
4B	Developing a Climate Adaptation Service Plan (2/2)		X	X	w/c 10/07/2022	Check-in on the progresses of the Service Climate Adaptation plans and foster discussions between LAs	YHCC to facilitate sharing and discussions

Session number	Title	Who should attend			Provisional date (Week Commencing or w/c)	What will be covered (determined by pre-session survey)	Format of the session
		Corporate Leads	Climate Support Officers	Service Leads			
5	Monitoring and evaluation – finalise M&E drafts & develop regional climate adaptation indicators		X		w/c 25/09/2023	Answer any questions on developing M&E plans Co-developing regional climate adaptation indicators	YHCC answering the gaps in knowledge raised by the survey What resources LAs do not have access to, what are they missing to get started etc Workshop to develop regional climate adaptation indicators
6	Communicate adaptation efforts to public (and maybe CCRA) & Community engagement	X	X		w/c 23/10/2023	How to communicate climate adaptation efforts to the public (and to Government if climate risk disclosure becomes compulsory under Adaptation reporting Power) LAs can share some community engagement initiatives that they run / support	Workshop and share experiences with the view to develop a template that all LA can use to communicate to the public at the end of the session - Emphasis on clarifying what LA does and what public is responsible for Facilitate sharing about community engagement around climate adaptation
7	Closing session	X	X	X	w/c 27/11/2023	Final thoughts on the Programme. What worked, what can be improved	Open discussion To be finalised

Appendix 1: Detailed actions and outputs for each Tier Local Authority

ACTION	LOCAL AUTHORITY RESPONSIBILITY(IES)				OUTPUT (AUDIT TRAIL)	RELATIVE EFFORTS/ INDICATION OF EFFORTS NEEDED FOR EACH ACTION & LOCAL AUTHORITY TIER *** More efforts/resources needed to establish/start the action ** Less efforts needed as action only needs to be furthered/maintained/ monitored * One-off action (when done, does not need to be followed or monitored again)			ACTION COVERED BY TRAINING SESSION NUMBER (See next worksheet called "Training session outline")
Action name	Corporate lead	Climate Officer(s)	Service lead(s)	Climate Adaptation Leadership team (together)	Output (Audit trail)	Tier 1 Local Authority (organisation is new to climate adaptation / does not have any formal adaptation processes in place yet)	Tier 2 Local Authority (organisation has already started with some formalised adaptation efforts e.g. develop an adaptation strategy, expoore adaptation governance landscape etc)	Tier 3 Local Authority (example of a climate resilient Local Authority ; organisation has well-developed formal adaptation processes in place (e.g. adaptation strategy, adaptation service plans (all) and M&E procedures)	
ASSEMBLE THE CLIMATE ADAPTATION LEADERSHIP TEAM (FOUNDATION STAGE 1)									
Build case for and secure Local Authority (LA) corporate/managerial buy in	X					*	*	*	0
Assemble the climate leadership team (corporate leader, climate adaptation officer(s), service leaders) Note: 3 service leaders included to start with and then add more service leaders as the Local Authority develops its adaptation efforts to cover all the services	X				Climate leadership team defined and roles and responsibilities clearly defined	*	*	*	0
Establish routine meeting schedules for a) the climate leadership team and b) updating the corporate lead on progresses with adaptation efforts					Meeting schedules in place for a) leadership team meeting and b) regular update on climate adaptation progresses to corporate lead	*	*	*	0
EMBED CLIMATE ADAPTATION IN ALL LEVELS OF THE ORGANISATION (FOUNDATION STAGE 2)									
Include climate risks in high level Local Authority risk register	X				Climate risks included in the Local Authority climate risk register	*	*	*	0
Establish a plan for developing climate literacy throughout the Local Authority	X	X	X		Document outlining the plan to develop climate literacy in all levels and functions of the Local Authority	***	**	**	0
GATHER CLIMATE ADAPTATION INFORMATION (POLICIES, FUNDING, ETC) (FOUNDATION STAGE 3)									
Map the adaptation governance landscape (national and local) and possible compulsory requirements that the Local Authority has to comply with (e.g. UK Climate Change Risk Assessment, UK National Adaptation Program if climate risk reporting becomes compulsory for Local Authorities etc.)		X			Document outlining the climate adaptation governance landscape	*	*	*	1
Gather a list about the possible climate adaptation schemes (e.g. Carbon Disclosure Project, ISO 14090:2019, Climate Emergency Pledge, UK Climate Change Risk Assessment etc.) and gather detailed information about these schemes (e.g. reporting information, schedule, deadlines etc.)		X			Document summarising the possible climate adaptation schemes	*	*	*	1
Gather information / start a register of potential funding sources or opportunities for funding for climate adaptation projects (external to the Local Authority, national or local levels)		X			Spreadsheet summarising possible avenues for funding climate adaptation projects/initiatives	*	*	*	1
DEVELOP M&E ROUTINES AND ALLOCATE M&E RESPONSIBILITIES FOR THE "FOUNDATION STAGES 1,2 AND 3"									
Develop schedules for monitoring:									1
1 Climate literacy through the organisation				X	Plan to monitor progresses on Local Authority climate literacy	***	**	**	1
2 Adaptation policies / governance landscape changes as well as Carbon Disclosure Project, ISO 14090:2019 etc. changes				X	Document outlining the plan to monitor the climate adaptation governance landscape	***	**	**	1
3 Potential sources of climate adaptation funding				X	Document outlining the plan to update the climate adaptation funding spreasheet	***	**	**	1
Allocate Local Authority responsibilities for the various M&E efforts for the "Foundation stages 1,2 and 3"				X	Document outlining the responsibilities for monitoring climate literacy, adaptation governance landscape and climate adaptation funding	*	*	*	1
DEVELOP THE LOCAL AUTHORITY ADAPTATION STRATEGY AND DRAFT AN ASSOCIATED MONITORING AND EVALUATION PLAN									
Decide on the climate adaption strategic goal(s) for the Local Authority; it could be following the Carbon Disclosure Project accrediation for public authority, or the ISO principles or for the Local Authority to develop its own climate adaptation principles and documents				X	Document outlining the discussion / agreed choice for the goal of the Local Authority Climate Adaptation Strategy	***	**	**	2
Develop the Local Authority Climate Adaptation Strategy				X	Local Authority Climate Adaptation Strategy document	***	**	**	2
Draft a M&E plan to monitor the Local Authority Climate Adaptation Strategy (How often the Strategy will be reviewed, the indicators to be used to track progresses etc) and allocate reponsibilities for monitoring the Strategy				X	Draft document highlighing the Local Authority leadership team early thoughts on monitoring and evaluating the Local Authority Climate Adaptation Strategy	***	**	**	2
DEVELOP THE SERVICE CLIMATE ADAPTATION PLANS (1 PER LOCAL AUTHORITY SERVICE) AND DRAFT ASSOCIATED MONITORING AND EVALUATION PLAN(S)									
Identify past extreme weather events vulnerabilities in the area under the jurisdiction of the Local Authority Note: if a service is already vulnerable to extreme weather events it will still be vulnerable in the future with climate change) and explore other extreme weather events and their potential implications for existing services		X	X		Document outlining the past extreme weather events that affected the Local Authority services in the past 10 years (??)	***	**	**	4A
Identify opportunities under extreme weather events (e.g. build back better...)		X	X		Document summarising the potential opportunities that could arise from extreme weather events in the Local Authority area	***	**	**	4A
Identify future climate risks that could affect the Local Authority service delivery in the future (affect negatively or positively)		X	X		Document summarising the future climate risks for the Local Authority and their (positive and negative) consequences for the Local Authority services	***	**	**	4A
Collate a library of potential adaptation actions per service and the supporting information associated with the action (whether it has been implemented before and where, indication of costs, scale etc.)		X	X		Database or document with some feasible adaptation actions to madiate extreme weather events and future climate chnagte with associated information	***	**	**	4A
In the light of the analysis of extreme weather events and future climate risks on the service, and with the list of adaptation actions developed, write the Service Climate Adaptation Plan(s) (1 per service)		X	X		One Climate Adaptation Plan per Local Authority service	***	**	**	4A
Draft a M&E plan to monitor the Service Climate Adaptation Plans (how often are the plans to be monitored, how will the climate adaptation action database maitained, what indicators could be used to track progresses, etc) and allocate reponsibilities for the monitoring and evaluation of the plans. Note: The service M&E plan(s) could be the same for all services or specific to different services				X	A draft document outlining how the Service Climate Adaptation Plans are going to be monitored and evaluated (one document or several if the M&E plans are to be different for each service)	***	**	**	4A
FINALISE M&E PLANS (FOR CLIMATE ADAPTATION STRATEGY AND SERVICE CLIMATE ADAPTATION PLANS)									
Finalise and implement the M&E plan to monitor the Local Authority Adaptation Strategy				X	Finalised document highlighing the Local Authority leadership team early thoughts on monitoring and evaluating the Local Authority Climate Adaptation Strategy	***	**	**	5
Finalise and implement the M&E plan(s) to monitor the Service Climate Adaptation Plans				X	Finalised document outlining how the Service Climate Adaptation Plans are going to be monitored and evaluated (one document or several if the M&E plans are to be different for each service)	***	**	**	5
COMMUNICATE CLIMATE ADAPTATION EFFORTS									
Agree on how adaptation efforts are going to be communicated to the public within the Local Authority jurisdiction				X	Document summarising the minutes of the meeting(s) where the communication of the Local Authority climate adaptation efforts was discussed	*	*	*	6
Agree on responsibility(ies) for communicating Local Authority climate adaptation efforts				X	Document summarising the minutes of the meeting(s) where the responsibilities for communicating the Local Authority climate adaptation efforts were discussed	*	*	*	6
Communicate the Local Authority adaptation efforts to national level if it becomes required (e.g. Climate Change Risk Assessment if reporting becomes compulsory for Local Authorities)				X	Document reporting the Local Authority climate adaptation efforts to National Government (if reporting becomes compulsory)	***	**	**	6
Communicate the Local Authority adaptation efforts locally, paying special attention to the public and Local Authority responsibilities/ mandate for climate adaptation				X	Communication material (e.g leaflets, newsletters, websites etc)	***	**	**	6
Collate examples of community engagement in climate change adaptation / support community initiatives in climate adaptation									6
Agree on a review schedule for communication material, issue of Local Authority climate adaptation newsletter etc				X	Document establishing how and when Local Authority adaptation efforts will be communicated	***	**	**	6

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28 February 2023

Climate Emergency Policy and Scrutiny Committee

Report of the Head of Environmental Services
Portfolio of the Executive Member for Environment and Climate Change

Highway Verge Wild Flowering

Summary

1. This report outlines the policy and decision making that underlies a range of projects carried out over the last two years to develop highway verges and grassland for pollinators.

Recommendations

2. The Scrutiny Committee is asked to:

3. note the following policy and decision making:

   i. that the policy context is set by highway safety considerations and then by the pollinator strategy
   ii. Wards and communities develop and lead projects
   iii. Funding is likely to be through ward funding or external funding so the decision to instigate lies with the Ward Councillors
   iv. Ongoing maintenance needs to be considered both in terms of a plan and funding

4. Provide any recommendations to the Executive for changes to policy or decision making.

   Reason - To support the Pollinator Strategy.

Background

5. In March 2021 the Council adopted a Strategy to support pollinators. The Scrutiny Committee have previously received an update on this policy and made no changes to the policy.

6. This report details activities which have contributed to two of the Strategies aims; *2.2 Increase the value of parks and other greenspace for pollinators* and *2.4 Make council owned land and buildings more pollinator friendly*. This report details examples of possible changes to the management of highway verges and amenity green space in support of the Strategy.

7. To encourage Wards to take part the Executive Member for Environment and Climate Change worked with officers to issue a short how to guide to all Ward Councillors which is attached as Annex 1.

8. Over the last two years three different approaches to mowing regimes have been trialled. The first has taken place in Wheldrake on a verge which has traditionally been cut by a local farmer; the second and third trial areas are in an urban setting along Hull Road. Further details are provided below.

9. In parallel the council has worked through Ward Committees to expand and improve grassland areas, such as the Fishergate side of the Millennium Bridge (Paragraphs 14 to 16). Further details are provided below.

10. The Pollinator Strategy also makes clear that projects should be community led, those in parks will be developed locally in consultation with residents and friends group or through the Ward Councillors and teams.

11. The rationale for this bottom up approach is to ensure that a local balance is struck between wild areas for biodiversity and pollinators and areas for active recreation.

12. The Pollinator Strategy sets, the policy context to undertake wildflower schemes and sets a bottom up approach to this. However, the Pollinator Strategy does not come with funding or a budget and therefore is delivered through changing existing activity or using ward funds.

Test projects

A. Wheldrake (for location see Annex 2)

13. As part of Ward led approach in Wheldrake Ward, a stretch of approximately 800m of rural highway verge on Wheldrake Lane has been developed through a partnership with Natural England and local volunteers, and the cooperation of a local farmer.

14. In this location the full depth of the verge on both side of the road was traditionally cut by a local farmer – some 7m from road to field boundary. The extent and time of the cuts did not take account of pollinator needs and cut grass was left in situ to decompose, adding to the overall nutrient enrichment of the verge.

15. In developing such a project, the first task is to find a suitable verge, one free of underground and overhead services and a safe to working environment for volunteers (i.e., a site with good sight lines, away from bends and having a suitable depth to be able to work a safe distance away from passing traffic). Road safety and site lines take priority in the way the verges are managed. The next task was to persuade the local farmer to stop cutting the verge.

16. Once these had been established the verge received a cut in early spring and all arisings were raked off and removed by volunteers. Specialist advice was provided by Natural England based out of Wheldrake Ings and seed and plug plants planted. In the autumn the area was cut and arising removed. The process was then repeated in year two. Going forward a mini baler has been purchased to make it easier to remove the arisings from site. The ward Councillor has written a more detailed review on this.

B. Hull Road / Field Lane (for location see Annex 3)

17. Hull Road ward committee worked with The Trust for Conservation Volunteers (TCV) to create a series of wildflower zones within an area of wide highway verges adjoining Hull Road and Field Lane. Here the areas to be developed were treated with weedkiller to create a sterile seed bed, rotavated, levelled and then seeded with a native wildflower mix. TCV then cut and removed the arisings in

the autumn. Small temporary notice boards explained what was happening in the area.

18. In the spring of year two the wildflower areas where cut and tidied to remove invasive weeds and additional plug plants added. The zones created can still be seen today.

C. Hull Road central reservation (for location see Annex 3)

19. This ward project built on previous flower seeding activity at Hull Road / Field Lane roundabout and the A1036 Wetherby Road roundabout.

20. Both roundabouts and four sections of the Hull Road double carriage way towards Grimston Bar, along with a short section by Badger Hill were cleared and then seeded with a vibrant pollinator friendly floral mix. The ambition here was to have two years of floral displays with limited intervention for the second year. Whilst year one produced very favourable result, in year two the beds had less of a visual impact and suffered from weed growth.

D. Millennium Bridge green space (for location see Annex 4)

21. In Fishergate the Ward Committee have funded Friends of St Nicolas Fields (St Nicks) to improve the biodiversity of the amenity open alongside the River Ouse near Millennium Bridge.

22. This is an area combines short mown amenity grassland useful for games and picnic, long grass areas with a single annual mow and woodland plantations. St Nicks were engaged by the Ward Committee to improve the care of the area by volunteer training, develop a management plan for the site and link up the areas of higher biodiversity value.

23. As part of the training programme volunteers are taught how to use hand scythes in the area closest to the Millennium Bridge. Scything takes place at different times of the year depending on the desired aim, i.e., to remove nettles and clear long grass to allow higher value plants to thrive. Arisings are removed from the species rich areas and composted elsewhere within the site. A permanent interpretive panel explains what is happening on the site.

Lessons learnt

Ward Led with Community Involvement Engagement

24. The importance of a bottom up community led approach has worked well. It ensures community buy in to the scheme and identifies and objectors to the scheme. Where this engagement has not been as thorough then issues have emerged with adjacent property owners.

25. All verge types require buy in from local stakeholders, be they a local farmer who thinks they are helping by cutting the verge to residents who may not appreciate the change of appearance or character of their local green space. On site information and social media can help explain what is happening and why.

Site Suitability

26. Prior to starting a verge development, it is necessary to confirm ownership, and to have the site checked for the presence of utility services and possible future highway improvement schemes and that site lines for road safety are maintained. For verges and open spaces, it may be prudent to consult with the council's highways, countryside, archaeological and contaminated land officers.

27. When involving volunteers, suitable arrangements need to be made for their management, include on site supervision, risk assessments, Personal Protective Equipment (PPE) and insurance cover. This is particularly true when the site being developed is adjacent to the highway.

Maintenance and budgets

28. The budget needs to be for more than the first years planting. Change is not a one-year activity. When seeking to change an existing rural verge repeated cutting and removal of the arising is required to allow plug plants and native flowers to succeed over grasses. For seed mix-based sites, repeated cut, remove, spray and re-sow needs to occur otherwise more dominant weeds and grasses will take over. Therefore, when considering a scheme, options for ongoing management of the site and any associated costs need to be factored into decision making.

29. Collecting and removal of arisings requires specialist machinery or significant volunteer input. A suitable repository for the arisings will be needed if they are taken for composting straight away.

30. Accidental and deliberate mowing of wildflower areas remains a possibility. Signage, local buy in and good information sharing are possible means to counter this. This includes within the Council so that areas are not accidentally cut and project to improve the information management provide to operatives is underway.

31. The Council's public realm team will support schemes but the level of input will depend on existing work programmes as any requests will have to fit around the existing core work programme.

Pollinator Impact

32. Over the last two years it has not been possible to quantify visits to the test sites by pollinators. Going forward this will now be possible with the purchase of Agri sound monitors as detailed at a previous committee.

33. The optimum time to start developing a verge is in the autumn for a display the following spring / summer.

Council Plan

34. This report supports and contributes to the following Council Plan priority – a greener and cleaner city

Implications

- **Financial** – There is no additional funding for wildflower projects. Therefore, their implementation is either through ward funding or external funding. Whilst the savings from grass cutting may result in a saving this often does not offset the ongoing cost. Any additional funding would need to be considered within the Council budget process and considered against other priorities.

Contact Details

Authors:	**Chief Officer Responsible for the report:**
Ben Grabham Head of Environmental Services Tel No: 07749 710152 Dave Meigh Strategy and Contracts Manager Tel No: 07923 217442	James Gilchrist Director of Environment, Transport and Planning **Report Approved** √ **Date** 20/02/2023

Wards Affected: **All** √

For further information please contact the author of the report

Background papers

Climate Emergency Policy and Scrutiny Committee 13th December 2022 Pollinator Strategy Update

Annexes

1. Initial guidance on how to

2. Wheldrake verge location

3. Hull Road area verge locations

4. Hull Road verge sample photographs

5. Millennium Bridge area location

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Annex 1

Wild Flower & Tree Template (circulated by Cllr Widdowson)

Background

Many people wish to do their bit to support and improve the environment, especially where concrete results can be seen. In particular the planting of wild flowers and trees are seen as a good thing to do and an activity which empowers our residents to become engaged to make changes.

5 Easy steps:

1. Is there an appetite for this activity?
   Across York the Big Conversation and the Climate Change Pledge have given support for general environmental actions. However, it's a bit 'motherhood and apple pie', so we all need to check that our residents wish to sow flowers and plant trees.

2. Is there a location?
   Wild flowers can be planted in verges but there are a few caveats; away from trees, be aware of visibility lines, be aware that the areas are no longer available for sporting activity, be aware that some residents will see the result as scruffy!
   Trees are a different matter. It is unlikely that trees can be planted in verges as most verges now have fibres/drains/cables laid through them. The best place to plant trees is more open spaces. However the trees need close maintenance for at least 3 years, so residents need to commit.

3. Is there a budget?
   Attached is a wild flower project from Hull Rd total cost £6.5k.
   Little Hob Moor had 38 trees planted last winter, total cost £8k. The money was raised 50% through crowd funding and 50% through ward budget. In general each tree cost £200.

4. Timing
   The best time to plant wild flower seeds is spring, this means the ground needs to be prepared late Feb/early March. It involves removing all grass and rotavating the area, then sowing the seeds. The area would then require cutting in late October. The type/quality of flowers will vary over time.

The best time to plant trees is Nov-March and there is a long lead time for trees when they have been ordered. All trees will need to be closely maintained for 3 years. Especially watering in spring and summer.

5. Resource
   Who is doing the doing, now and in the coming years? TVC , Officers and residents. There have been many experiences when residents/volunteers have been keen but do not have the skills to deliver or bored after a few months. This area needs careful consideration.

Summary
Included are the 2 guides for wild flowers and 2 for trees (*not attached)* which identifies how the work was delivered through the community engagement officers, Dave Meigh and TVC /St Nicks (details overleaf). Be aware that resources are scarce, so we need to work cooperatively to deliver this work in your ward.

Contact details:

David Meigh (CYC)
Email: Dave.Meigh@york.gov.uk

Mob: 07923 217442

The Conservation Volunteers (TVC)
Tang Hall Community Centre
Fifth Avenue
York
YO31 0UG

Email: york@tcv.org.uk

Friends of St Nicholas Fields

St Nicks Environment Centre
Rawdon Avenue
York
YO10 3ST

Email: info@stnicks.org.uk

Guide 1 – Procurement

Hull Road Ward wild flowering project (*illustrative purposes only, not all documents included for the Scrutiny report)*

Location of work

The requirement is to develop three areas of wildflowers on Field Lane, York YO10 5JN and YO10 5JL. The locations are show in Annex 1. The extent of the planted area is to be set out by the contractor in their tender submission. A utilities check has been carried out and this information is provided as Annex 2. This does not remove the responsibility of the contractor to carry out their checks for utilities as set out in the work required.

Work required

Timing of works

- The contract is for two years, starting from March 2020
- To avoid the area looking bare all winter the ground preparation work should be planned for late winter / early spring.

Pre Work Activity

- Ensure all safe system of work are up to date and include all necessary risk assessments and method statements for the work planned including control measures. Specific attention must be paid to working close to the Highway.

Preparation

- Check the area for services and mark any areas to be avoided
- All relevant Health and Safety related signs and traffic cones will be provided by the contractor and are to be in place during all works.
- Once all services are identified apply a Glyphosate based herbicide to the area to kill all grass and weeds
- Once all grass and weeds are dead, cultivate the area.
- Prepare the area by use of hand rakes to form a fine tilth ready for sowing seed
- Sow the seed
- Roll the area

- Ensure the area is lightly irrigated if prolonged dry weather takes place

Type of seed

- Use a perennial seed mix
- Species that do not exceed 500mm in height

Aftercare

- Wildflowers to be cut and removed at the appropriate time
- Prior to the completion of the two year project the contractor is to provide to CYC a plan for future maintenance of the location
- The contractor is to leave the area clean and tidy at the end of the contract.

Community engagement and signage

- In developing the wildflower areas the contractor is required to work with volunteers, and preferably, the local community to both raise local awareness of the project and the environmental benefits its provides
- Signage is required to explain what is going on and who is involved in the project.

Payment arrangements

The contractor will be paid in four equal instalments:

Tender Return

The contractor is required to provide

- A map or plan showing the areas to be managed
- A price for the work broken down by year 1 and year 2
- Proposed safe system of work, risk assessments and control measures
- Proposed timetable for work
- The name(s) of any chemicals to be used and COSHH assessments
- The proposed seed mix
- Proposals for involving volunteers / local community
- Proposed signage

This information is to be returned to

Guide 2 On site activity

Community wild flowering project

Hull Road ward have used ward funding to carry out a wild flowering project in Field Lane. This document outlines the steps taken to commission this work.

1) Ward team identifies potential area/s of land for the project
2) Community Involvement officer liaises with the Public Realm Team (Dave Meigh) to check the ownership and suitability of the land for planting. This will include a check of underground utilities.
3) Community Involvement officer/Public Realm to produce a tender document to be sent out through the formal procurement process to outline the requirements of the project and invite tenders. This will include information on the required timescales and duration of the project, all activity required in the preparation, planting and aftercare, payment arrangements and a request for the group to provide details of how they will involve the community in the project. A map with the relevant area highlighted is also included. The example tender document for the project in Hull Road ward is attached.
4) Procurement process followed to review tenders received and choose which organisation to commission. The Conservation Volunteers were commissioned to carry out the project on Field over a two year period with preparation and sewing in year one and after and planning for future maintenance in year two. Payments are being made in four instalments following each section of the work.
5) The local community were encouraged to get involved in the initial planting, signage was put up at the site to advise people of the project and how they could get involved and flyers were delivered to all the properties in the area. TCV will be working on encouraging local residents to take over the maintenance of the site once the two year tender period has ended.
6) The total cost to the ward over the two year period is £6,200 for everything needed to successfully complete the project.

Preparation

Signage

Wheldrake Lane

Date: 16 Feb 2023

Author: City of York Council

Scale: 1:7,000

0 0.1 0.2 0.3 0.4 0.5
km

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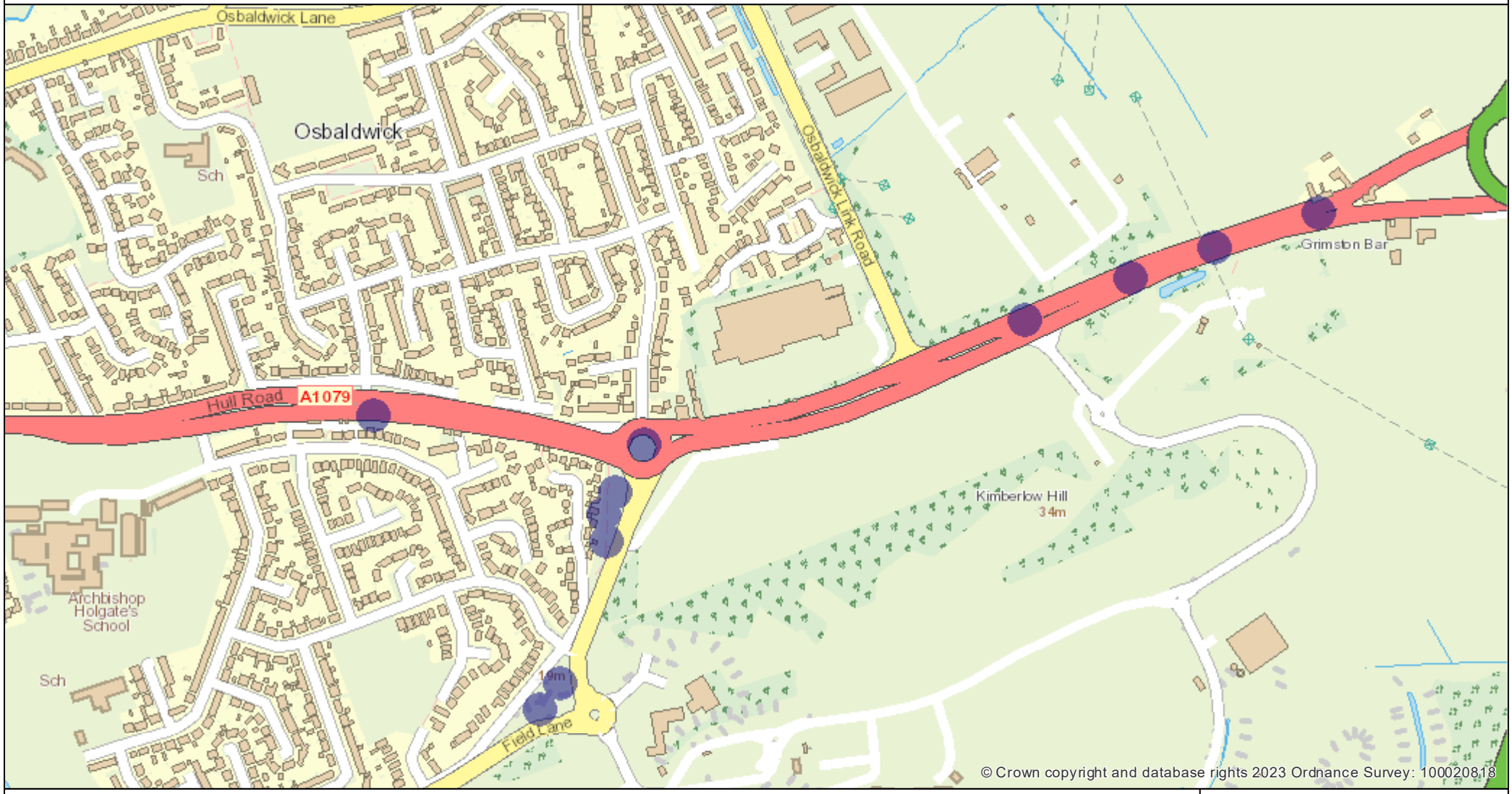
Hull Road - wildflower areas



Date: 14 Feb 2023

Author: City of York Council

Scale: 1:7,000

0 0.1 0.2 0.3 0.4 0.5
km

CITY OF YORK COUNCIL

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Annex 4

Hull Road central reservation summer 2021

Developed verge

Undeveloped verge – showing typiual weed / grass growth seen in summer 2022

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Millennium Bridge area

Date: 14 Feb 2023

Author: City of York Council

Scale: 1:4,000

0 0.08 0.16 0.24 0.32 0.4
km

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Climate Emergency Policy and Scrutiny Committee **28 February 2023**

Report of the Director of Transport, Environment and Planning
Portfolio of the Executive Member for Environment and Climate Change

LED Lighting Update Solar Lighting

Summary

1. The Council has converted 60% of its 21500 lamp columns to Light Emitting Diode. LED reduces power usage by approximately half. All new lights are changes to LED where ever possible. Solar technology is progressing and is therefore kept under review. This report constitutes a formal review.

2. City of York Council has installed solar lighting in amenity areas such as Hull Road Park and at Bus Stops. This amenity lighting has worked well.

3. In response the Council has commissioned work to review the technology of solar lighting and its suitability for street lighting.

4. Unlike amenity lighting the Council has a street lighting policy that sets out the way street lighting should be designed and managed.

5. This report details an ongoing piece of work to review the technology of solar lighting and its suitability to meet the current design standards for highways and considers where it may be possible to deploy further solar lighting.

6. The technology is developing and progressing all the time and it is recognised that this report will need to be reviewed as new products come to the market.

Recommendations

7. The Economy and Place Scrutiny Committee is asked to:

- Note the ongoing work to assess the suitability of solar lighting for street lighting.
- Consider any recommendations for a change in the Street Lighting Policy

8. Reasons:

- Paper requested by Economy and Place Scrutiny Committee.

Background

Existing Asset Profile and Investment

9. The Council is responsible for approximately 21,500 lighting columns. These are a mixture of concrete and steel columns.

10. An ongoing investment programme has replaced the columns which are structurally impaired and at risk of failure. Approximately 270 columns are replaced each year Whenever a column is replaced, new lanterns are fitted to the new column. There are approximately two to three years left to complete this programme.

11. The lanterns on City of York Council columns are made up of the following technology

- Low Pressure Sodium – a monochromatic orange coloured light source that gives a good efficacy (light output in lumens per watt) but has very poor colour rendering (measured in Ra as 0) making even orange coloured items appear different. It also has poor glare characteristics and is very hard to control with the majority of light going straight up or backwards. It has a low life expectancy for the lamp (bulb).
- High Pressure Sodium – a peach coloured light of medium efficacy and a reasonable colour rendering (Ra of 25). It has been popular from the 1980's until recently as it gave good all round performance with a choice of good optical control. The life expectancy of this is good with five years between lamp changes now being experienced.
- Fluorescent – a white coloured source with high colour rendering (above Ra 60) but good efficacy and a low lamp life (as experienced by the Council). It is more commonly used for signage and bollards and has been used to replace mercury fittings in the city.

- Metal Halide (including Cosmo) – a white light source of high colour rendering and efficacy with a good lamp life. Similarly to high pressure sodium it has been popular in areas where good lighting and colour recognition is required i.e. CCTV and central areas.
- LED's- These currently offer the best rendering with the longest life and good efficacycy. Being a more directional point type of lighting source it also offers good control.

12. All new schemes use LED lanterns. The Council has also invested and converted approximately 60% of street lights to LED technology.

13. Conversion to LED reduces the energy consumption by approximately half depending on the original lamp with the accompanying environmental benefits.

14. The reduction of energy usage results in a financial saving as we work with Northern Power Grid to establish the usage of our unmetered street lighting assets.

15. The charge per unit is outside the Council's control and can be flexed by the energy suppliers in response to the markets and the way the street lighting assets are managed by local authorities.

Lighting Design Duties, Powers and Standards

16. There are currently no statutory obligations or requirements for a local authority to provide street lighting, instead the following statutes enable them to provide public lighting.
    - The Highways Act 1980 empowers a local Highway Authority to provide lighting where they are or will be the Highway Authority (existing roads or new developments). District and Parish Councils have devolved powers as local lighting Authorities conferred under The Public Health Act 1985 and The Parish Councils Act 1957 (however consent must be given from the Highway Authority).
    - With these powers the Highway Authority has a duty of care to the users. Any loss or injury to an individual due to the inappropriate use of these powers may result in action being taken to recover the losses claimed. Action can be taken on several grounds including – negligent exercise of power; action for misfeasance of public office; breach of common law duty of care (if it can be established). NOTE: This duty of care does not imply a duty on the Highway Authority to keep the public lighting lit. Instead it implies a duty to ensure systems and processes are in place to maintain and keep the

lighting in a safe condition i.e. the detection of dangers electrical or structural.

- The Health and Safety at Work Act 1974, the Management of Health and Safety at Work Regulations 1992 and the Construction (Design and Management) Regulations 2007 set out the arrangements and requirements for works to be carried out in a safe manner, along with establishing arrangements for managing construction works.
- The New Roads and Street Works Act 1991 enables the duties of Street Authorities to coordinate and regulate works in the highway. All underground cables therefore should be recorded in accordance with this Act along with the requirements of the Electrical Safety, Quality and Continuity Regulations 2002.
- Other frameworks of legislation that do not specifically relate to highways or public lighting functions (not exhaustive) but deal with issues of the services involved and their provision are – the Equality Act 2010, the Criminal Justice and Public Order Act 1994, Annex A of the Human Rights Act 1998, the Freedom of Information Act 2000 and the Local Government Act 2000.

Design Standards and Considerations

17. In addition to and including the legal powers and duties to enable City of York Council to have a high quality and consistent approach to lighting, the following considerations are considered as part of developing a lighting design for each location:
    - the primary user of the highway;
    - any special requirements for vulnerable users i.e. pedestrians, cyclists, heavy traffic;
    - the location and environmental classification / zone of the highway;
    - the usage of the highway / area i.e. car park, square, architectural;
    - the location of local amenities e.g. schools, public buildings, shops;
    - daytime and night time visual appearance of equipment;
    - obtrusive light and pollution;
    - energy efficiency - whole cycle carbon emissions and costs;
    - equipment reliability (some lighting types need very little maintenance e.g. LED’s);
    - equipment locations in relation to obstructions and maintenance;
    - whole life costs;
    - strategies relating to whole streetscape i.e. Conservation approach “historic core”;
    - end of life equipment disposal i.e. recyclability;

- public risk from accident i.e. passively safe columns, pedestrian crossings and conflict areas.

18. The Council's street lighting policy requires that all new schemes, conversions and upgrades are designed to BS5489 2013 Code of Practice for the Design of Road Lighting and BS EN 13201 2003 Road Lighting.

19. BS5489 2013 - recommendations are given for general principles of road lighting including aesthetic, technical aspects, operation and maintenance. BS5489 2013 considers the design of lighting for all types of highways, public thoroughfares and pedestrian and cyclists subways and bridges. It also covers the design of lighting for urban centres and public amenity areas, aerodromes, railways, coastal waters, harbours and navigable waterways. It provides tables of lighting levels that authorities should consider for different locations and situations.

20. BS EN 13201 2015 – this is a design standard on the selection of lighting in different locations, performance requirements, calculation of performance and methods of measuring lighting performance and energy performance indicators

21. Options for Solar

22. Solar lighting has proved successful as amenity lighting, such as at Hull Road Park and around bus stops. However, these locations have different requirements to street lighting. For instance, the LED lanterns on the Solar columns in Hull Road Park dim to 10% after the latest park closing time and then the levels come back up on motion sensors, which are rarely triggered as the park is locked most of the evening. These have been successful.

23. However, when considering using solar lighting for street lighting on the adopted highway, the ability of the technology to meet the Council's standards needs to be considered.

24. The Council have commissioned a report from WSP (see Annex A). A second report has been commissioned to evaluate Hull Road Park lighting and its suitability for the adopted highway.

25. The WSP report considers that solar lighting is currently only suitable for footway (with no carriageway) and park lighting. In these types of installations there needs to be a control system that dims the lighting

when people are not about and then brings it back up in sections when people wish to use the path.

26. The conclusion is that, from an economic business case, solar is not cost effective where a cable supply is currently present. Where a cable supply is not currently present solar maybe the most economic option, but noting that lighting levels and current adopted policy may not be met.

27. The WSP report recognises that alternative power solutions are rapidly evolving, and it is highly probable that future product designs and research will make the solutions discussed viable in UK within the next few years.

Current Policy

28. The Councils current street lighting policy states that where a bollard (keep left/right, no-entry) is required to be lit the authority replaces it with a solar powered unit. This cuts the energy requirements to zero and reduces safety implications from mains electric. But does talk about ongoing trials.

Next Steps

29. Solar technology as it stands cannot illuminate to the Council's Street Lighting Policy and the stated levels the Council illuminates to on our Adopted Highways and in line with BS 5489.

30. Officers are preparing expressions of interest to obtain further funding for the conversion of the remaining street lighting which has not been converted to LED as the business case remains challenging.

31. There are areas which can benefit from solar and officers will continue to use solar for parks and footways. Following trials the Council will specify solar for illuminated traffic signs, bellisa beacons and school flashing units where appropriate.

32. Whilst the technology is not yet suitable for solar as street lighting to meet the current policy, officers are also developing a small proposal for a trial of solar street lighting. This would require the council to depart from standards around adopted lighting levels but may be suitable for a quiet residential street. It would therefore require resident engagement on the proposals before a decision is made.

Consultation

33. As detailed above, any lighting which is a departure from standard and will result in changed lighting levels should be done in consultation with the immediate residents.

Council Plan

34. Getting around sustainably

    The provision of public charging supports the adoption of plug-in vehicles.

35. A greener and cleaner city

    The provision of public charging supports the adoption of plug-in vehicles which support these objectives. Whilst noting that private vehicles are at the bottom of the travel hierarchy, the York Public EV Charging Strategy has been developed to respect wider transport objectives and avoid counter productive measures.

Implications

36. **Financial**
    There are no financial implications any decisions would require a business case and financial considerations.

37. **Equalities**
    The Council needs to take into account the Public Sector Equality Duty under Section 149 of the Equality Act 2010 (to have due regard to the need to eliminate discrimination, harassment, victimisation and any other prohibited conduct; advance equality of opportunity between persons who share a relevant protected characteristic and persons who do not share it and foster good relations between persons who share a relevant protected characteristic and persons who do not share it in the exercise of a public authority's functions).

    Equalities Impact Assessments will be carried out as and when appropriate.

38. Legal

The legal powers and duties have been set out in the body of the report.

Contact Details

Author:	**Chief Officer Responsible for the report:**
Derek Grant Street Lighting Manager	James Gilchrist Director of Transport Environment and Planning

Report Approved [x] **Date** 20/01/2023

Wards Affected: List wards or tick box to indicate all **All** [x]

For further information please contact the author of the report

Background Papers:

Street Lighting Policy adoption 15/11/2018 Executive Member for Transport
https://democracy.york.gov.uk/ieDecisionDetails.aspx?ID=5358

Annexes

Annex A Solar PV Assessment by WSP

City of York

SOLAR PV ASSESSMENT

AUGUST 2022

CONFIDENTIAL

City of York

SOLAR PV ASSESSMENT

TYPE OF DOCUMENT (VERSION) CONFIDENTIAL

PROJECT NO. 70097883-SLA

DATE: AUGUST 2022

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QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Initial Issue	Amended to client comments	Addition of fiscal analysis and further conclusions and recommendations	
Date	26/08/2022	11/11/2022	12/12/2022	
Prepared by	Aikaterini Xynogala	Aikaterini Xynogala	Aikaterini Xynogala	
Signature			Xynogala, Katerina (UKAXX002) 2022.12.14 08:58:35	
Checked by	Daniel Scolari	Daniel Scolari	Daniel Scolari	
Signature			Scolari, Daniel (UKDXS068) I have reviewed this document 2022.12.14 08:13:07	
Authorised by	Rebecca Hatch	Allan Howard	Allan Howard	
Signature			Howard, Allan (UKAPH003) Digitally signed by Howard, Allan (UKAPH003) DN: cn=Howard, Allan (UKAPH003), ou=Active, email=Allan.Howard@wsp.com Date: 2022.12.14 08:57:59	
Project number	70097883-SLA	70097883-SLA	70097883-SLA	
Report number	70097883-WSP-XXX-XX-RP-EE-0001-P01	70097883-WSP-XXX-XX-RP-EE-0001-P02	70097883-WSP-XXX-XX-RP-EE-0001-P03	
File reference				

The findings and opinions expressed are relevant to the dates of the site works and should not be relied upon to represent conditions at substantially later dates. Opinions included therein are based on information gathered during the study and from our experience. If additional information becomes available which may affect our comments, conclusions or recommendations WSP UK Limited reserve the right to review the information, reassess any new potential concerns and
modify our opinions accordingly.

Revisions in this document are noted by the use of sidebars.

CONTENTS

TABLES

FIGURES

APPENDICES

EXECUTIVE SUMMARY

Figure 1 - Solar column lighting

The City of York (CoY) council has declared a Climate Emergency[1] and has an ambition to become a city with net-zero carbon emissions by 2030. We have been commissioned to investigate the viability of alternative power supplies for public lighting and how if viable they can reduce carbon emissions within CoY.

This report aims to detail alternative energy supplies and explore the viability of available solutions on the market. The lighting inventory and structure of York has been analysed to classify the viability of such technologies in York and the potential for returns in investment. The main alternative energy supply form identified as having the potential to be appropriate for use in CoY is solar PV panels. Photovoltaics (PV) converts light into electricity. Solar PV panels are panels used for the conversion of sunlight into electricity are increasingly becoming ubiquitous with onsite renewable energy generation.

The system would need to work as a hybrid system which has the potential to draw power from the grid if there is not enough sunlight available for areas in which availability of supply is critical. The report analyses the requirements, and street lighting assets available on different areas in York; and considers the feasibility of installing solar PV panels on them. The report concludes that based on the analysis provided, the primary agenda driving the switch to alternative power supplies needs to be climate and not fiscal, since there may not exist a lot of potential for economic savings through switching to solar supplies. Further feasibility studies in areas with a higher economic return potential may be required, and structural testing of all lighting columns would be necessary. A solar trial to explore real world performance and provide assurance around availability of supply may be required.

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[1] https://www.york.gov.uk/ClimateChange

1

INTRODUCTION

1 INTRODUCTION

According to UN-Habitat, cities consume nearly three-quarters of the world's energy and produce more than 60% of their greenhouse gas emissions.[2] Currently, cities need to lower their energy demand and consumption whilst supporting larger, wealthier populations and meeting citizens' expectations for local environmental quality. In 2019, the City of York (CoY) announced a Climate Emergency and have since set an ambition for York to be a net-zero carbon city by 2030.[3]

Throughout this investigation, the 'energy trilemma' is observed within the urban landscape and street lighting. The energy trilemma is used to describe the balance between the following three areas[4]:

- The maintenance of secure energy supplies,
- The social impact of using different energy supplies such as ensuring the long-term affordability of the system, and
- Their environmental impact.

Street lighting is one of the biggest energy consumers for local authorities including CoY. Past investment policies of smart lighting and LED upgrades have looked at how the electrical load can be reduced and managed. This has been one of the proven solutions that most local authorities have utilised to help meet carbon reduction targets. As per CoY's May 2022 inventory, approximately 60% of the city's lighting assets are LED (see section 5 for more details). More updates could prove beneficial for meeting the city's energy consumption and reduction targets, and for making alternative power supplies more efficient for further reductions.

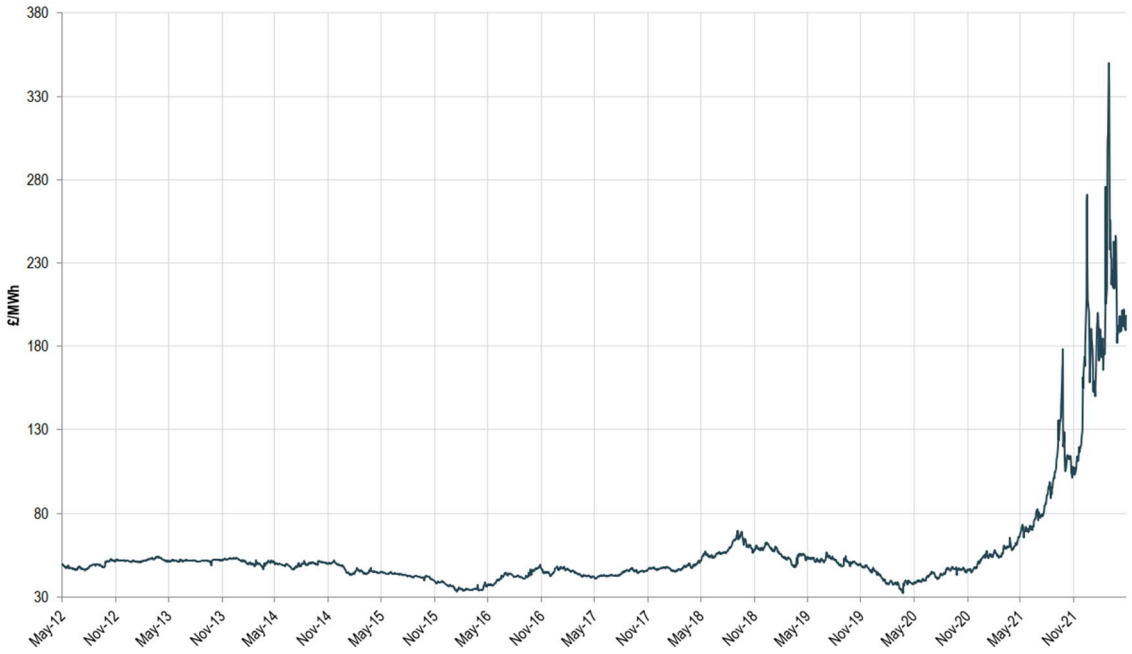
The reduction targets are not only related to local Net Zero targets. They are also influenced by rising UK road lighting energy costs. These have risen due to the word's political situation and the increasing demand for electricity at night. The introduction of EV charging points, energy storage systems, and the new requirement for housing heating to be electric only have risen the total overnight energy use. The energy cost profiles shown on figure 1-1 are expected to increase more due to the current energy crisis. The cost of street lighting is currently around 35 to 40 p/kWh – seeing an increase of approximately 32% compared to the original costs of running it (11 to 13p/kWh); the current inflation, particularly on energy prices, will only further increase these costs.

One of the main alternative power supply methods for reducing the use of power from the grid is solar PV panels. Photovoltaics (PV) converts light into electricity. Solar PV panels are panels used

[2] https://www.un.org/en/climatechange/climate-solutions/cities-pollution#:~:text=Cities%20and%20Pollution&text=According%20to%20UN%20Habitat%2C%20cities,cent%20of%20greenhouse%20gas%20emissions
[3] https://www.york.gov.uk/ClimateChange
[4] https://www.carbonbrief.org/climate-rhetoric-whats-an-energy-trilemma/

for the conversion of sunlight into electricity and are increasingly becoming ubiquitous with onsite renewable energy generation.

Figure 1-1 - Lighting energy cost profiles from 2012 to present



Through this document, we investigate the viability of alternative power supplies and where these may be viable, we report how alternative power supplies to public lighting can reduce the consumption of electricity and carbon within CoY. The report is structured as follows:

Background considerations on alternative power solutions and streetlighting columns will be followed by a technology review of alternative power products. Then a high-level analysis of the CoY's existing assets will be conducted. Based on these sections an analysis of the viability of this technology in York will be considered followed by a summary of the investment potential on solar technologies.

2

UNDERSTANDING SOLAR AND WIND CONSIDERATIONS

2 UNDERSTANDING SOLAR AND WIND CONSIDERATIONS

When we are considering solar energy, we are talking about the available solar power from the sun falling on solar photovoltaic (PV) panels and thus generating electricity. Solar PV panels and their availability of the market will be defined and analysed in section 4. Solar energy is measured in terms of Kilowatt Hours per square metres kWhr/m^2. This unit indicates the amount of hourly power (kWh) produced per squared metre on an area of interest. For the purpose of this report, the area of interest is the solar PV panel located on street lighting and other highway electrical street furniture. Power is the rate of delivery of energy, and therefore how much energy is derived per second.

Wind energy is referring to the kinetic energy of air in motion. This energy can be converted by wind turbines into electrical energy. Wind energy can be measured in Kilojoules per square metre kJ/m^2. This indicates the amount of available energy kJ per squared metre.

2.1 AVAILABILITY OF SUNLIGHT

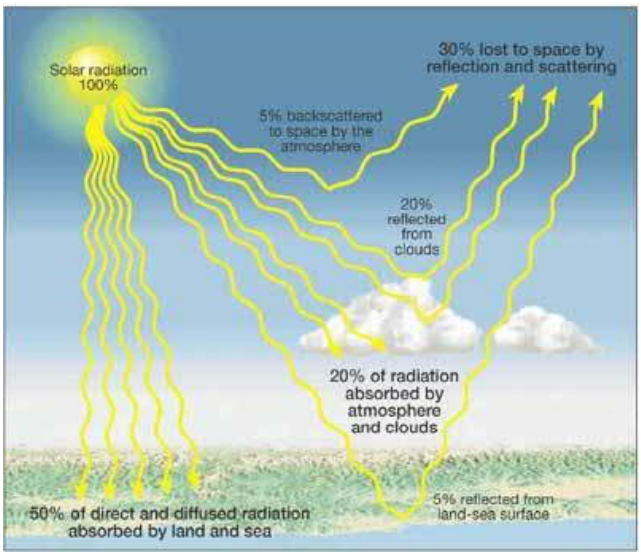
The availability of sun light is affected by a range of considerations:

2.1.1 CLIMATIC AND GEOGRAPHICAL CONDITIONS

Solar radiation is reduced through climatic influences, and geographical conditions. Climatic influences are the effect of atmosphere (reflection off and absorption by the atmosphere), reflection / blockage by clouds.

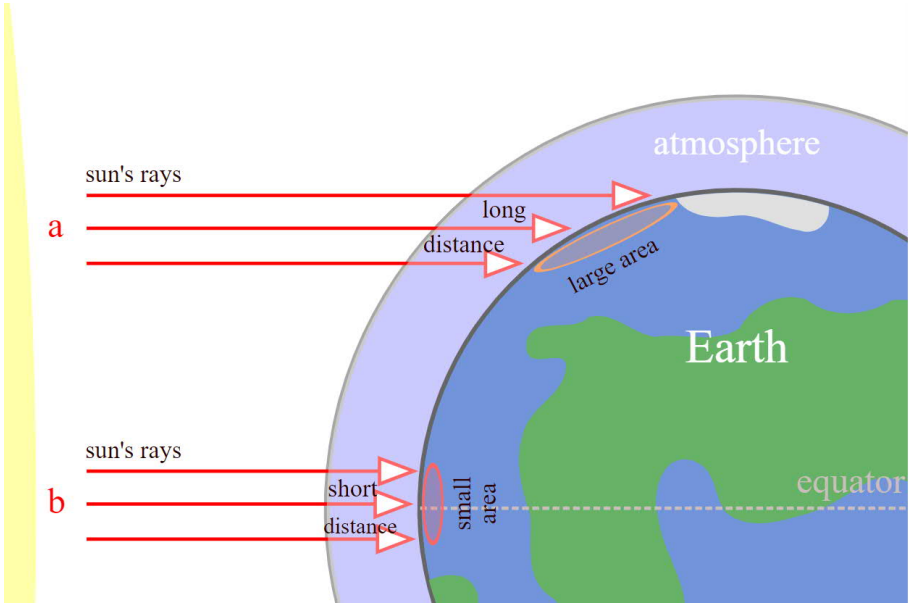
Geographical influences consist of the shadowing caused by buildings, trees, and other ground features. Neighbouring buildings, trees or natural features can shade part or the whole of an area of interest, affecting overall energy generation.

Figure 2-1 - Solar radiation reductions from atmosphere and clouds



The location of an area in relation to the equator is a geographical condition that influences the sunlight availability. This is also highly influenced depending on the time of year.

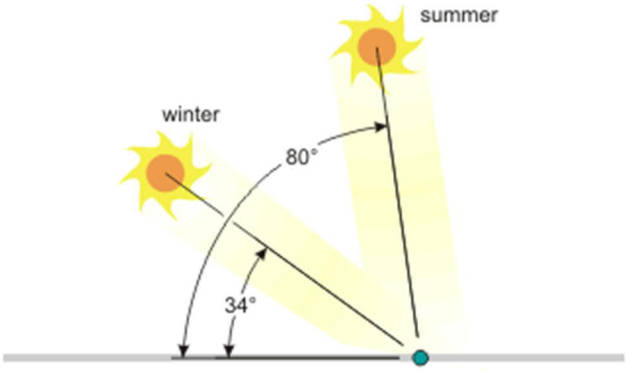
Figure 2-2 - Sunlight availability on different areas



2.1.2 TIME OF YEAR

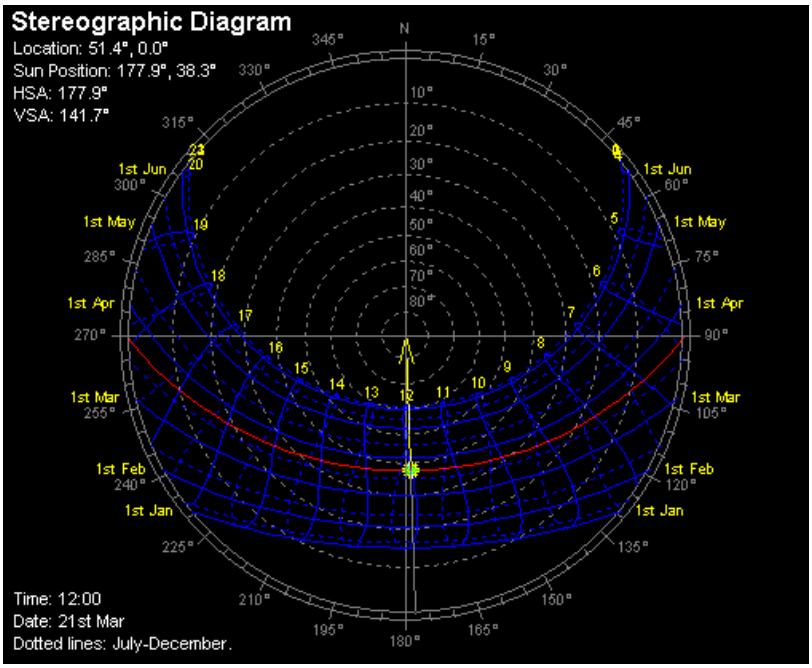
The azimuth of the sun (height above the horizon) varies over the year with the sun being more overhead during the summer and lower down over the winter. The angle of the sun in summer and winter an important step to determine the optimal orientation is review the site of solar PV panels used.

Figure 2-3 - Angle of sun in summer and winter



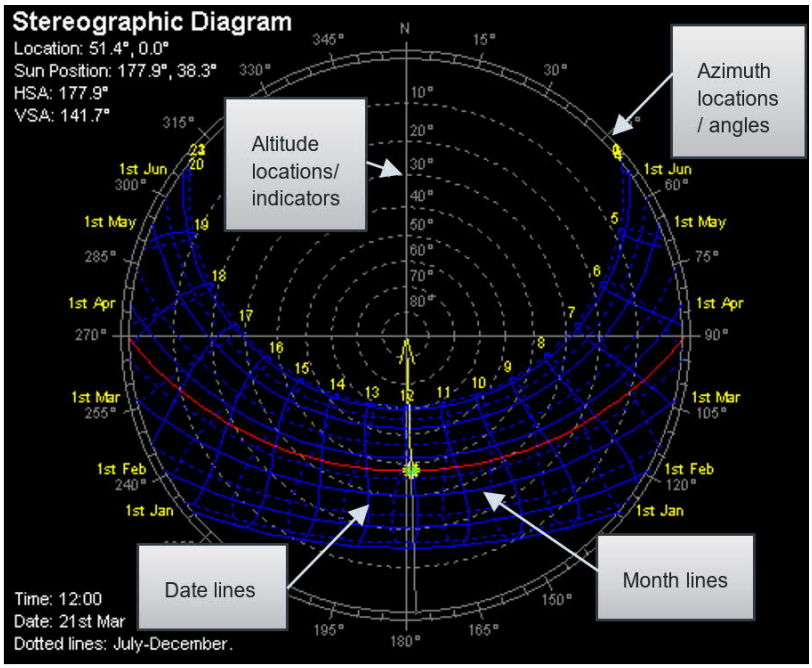
Sun path diagrams or sun charts are projections of the sky dome onto a surface. The stereographic projection is most commonly used and an example is shown in figure 2-4 below and provides an indication of sun availability over the year.

Figure 2-4 - Stereographic projection



The blue lines on the diagram indicate the month and time of year. The straight lines are used to indicate January – June, and the doted lines show July-December. In order to find the location of the sun at a specific day and time, the intersection between a specific time and month needs to be determined. Dotted lines need to be intersected with dotted lines, and straight lines with straight. Then the location of the sun can be found through the location of the intersection on the diagram. The azimuth location of the sun is indicated as an angle going clockwise from the north- the values are indicated around the circle of the sun diagram. The altitude lines are indicated by the concentric cycles in the diagram.

Figure 2-5 - Marked-up stereographic projection



2.2 AVAILABILITY OF WIND

The availability of wind gets influenced by different forces which can relate to climatic and geographical conditions and the earth's movement. Wind gets influenced by the changes of the pressure gradient which is a change of pressure over distance. This is mostly influenced by the geology of an area and characteristics such as the presence of mountains.

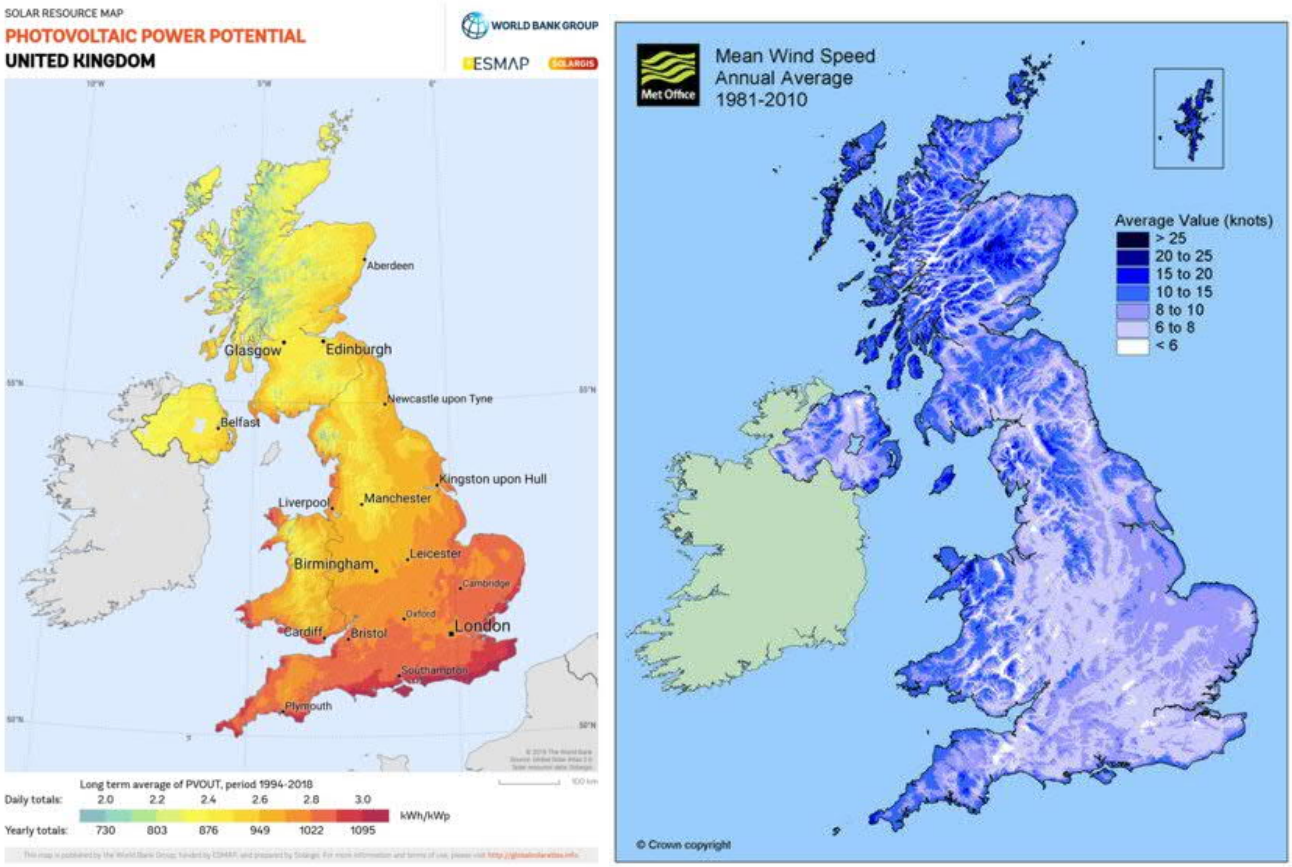
Another big influence to the wind's power is turbulent drag, which is caused when the earth's surface of objects such as buildings and trees cause resistance to airflow and reduce the wind speed. Based on this, the wind speed in an urban environment such as CoY is expected to be less than a nearby rural environment, if there are not any other prevalent forces influencing wind.

There are also different forces such as the centrifugal force which make winds move across curved paths. These have multiple influences including the movement of the earth and the location of an area of interest.

2.3 WIND AND SUN DISTRIBUTION IN UK

Wind availability tends to balance out solar availability across the UK as can be seen in the solar and wind resource maps shown in figure 2-6.

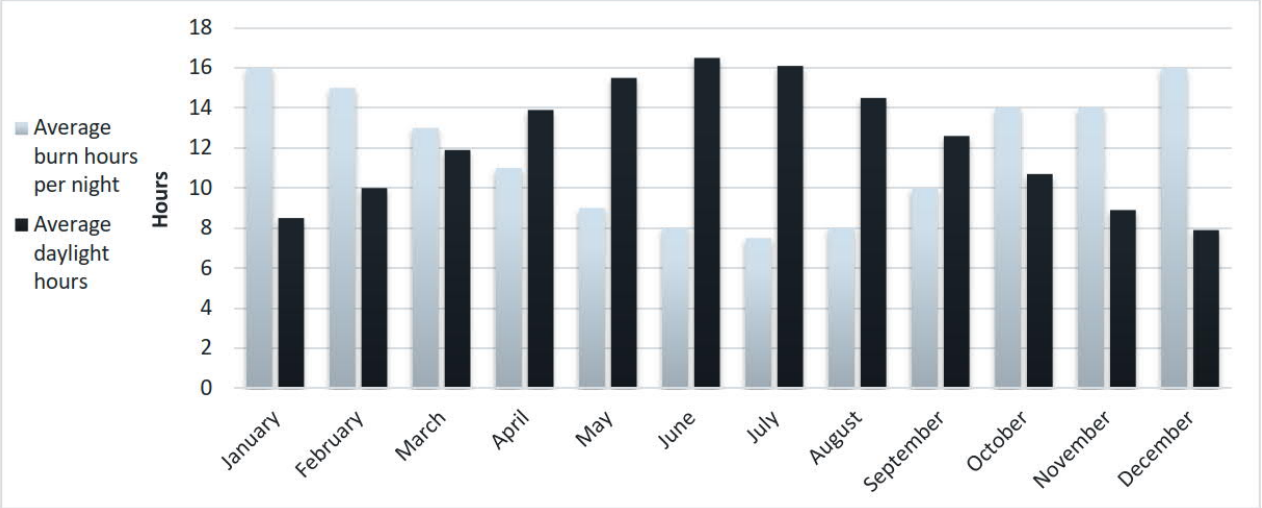
Figure 2-6 - Solar and wind resource maps



2.4 SOLAR AVAILABILITY AND STREET LIGHTING

Unlike wind availability, the provision of solar availability is unevenly distributed over the year, and this is clearly indicated in figure 2-7 which shows the average solar hour viability by day compared to the average night-time hours.

Figure 2-7 - Uneven distributed solar energy



This is an important consideration when looking at the provision of solar power for highway lighting. The following two demand profile tables are provided by Kight off grid solutions and show the ability of a column mounted solar array in an open landscape to charge a battery source and then power a 24W luminaire for each month of the year. Table 2-1 shows the results estimated if the luminaire is on full power at night, and table 2-2 shows how the system would perform if dimming is applied halfway through the night.

Table 2-1 - The luminaire is powered at 100% all night

Demand Profile 1

KIGHT

Solar PV demand profile 1 (100% lighting during twilight hours)

Month	Generation (Wh)	Available Energy	Demand	Gen < Demand	Days - Gen < Demand	Average SOC	Days - Storage < Demand
Jan	2,428.03	2,283.56	4,776.00	-2,492.44	29	2%	28
Feb	2,356.23	2,216.03	3,924.00	-1,707.97	24	5%	21
Mar	4,942.30	4,648.23	3,588.00	1,060.23	8	85%	2
Apr	6,719.45	6,319.65	2,688.00	3,631.65	0	100%	0
May	6,859.90	6,451.74	1,788.00	4,663.74	2	99%	0
Jun	7,441.19	6,998.43	1,080.00	5,918.43	0	100%	0
Jul	7,104.92	6,682.18	1,464.00	5,218.18	0	100%	0
Aug	5,666.89	5,329.71	2,364.00	2,965.71	3	99%	0
Sep	5,359.24	5,040.36	3,156.00	1,884.36	8	93%	0
Oct	3,450.03	3,244.75	4,080.00	-835.25	21	40%	11
Nov	2,456.41	2,310.25	4,560.00	-2,249.75	27	3%	24
Dec	2,124.73	1,998.30	4,836.00	-2,837.70	31	0%	31
					153		117

Table 2-2 - The luminaire is dimmed to 50% between 00.00 and 05.00 each night

Demand Profile 2

4 - Solar PV demand profile 2 (100% lighting except between 12-5am where is it 50%)

Month	Generation (Wh)	Available Energy	Demand	Gen < Demand	Days - Gen < Demand	Average SOC	Days - Storage < Demand
Jan	2,428.03	2,283.56	3,846.00	-1,562.44	25	7%	20
Feb	2,356.23	2,216.03	3,084.00	-867.97	21	15%	16
Mar	4,942.30	4,648.23	2,658.00	1,990.23	5	95%	0
Apr	6,719.45	6,319.65	1,788.00	4,531.65	0	100%	0
May	6,859.90	6,451.74	1,044.00	5,407.74	1	100%	0
Jun	7,441.19	6,998.43	540.00	6,458.43	0	100%	0
Jul	7,104.92	6,682.18	792.00	5,890.18	0	100%	0
Aug	5,666.89	5,329.71	1,470.00	3,859.71	2	100%	0
Sep	5,359.24	5,040.36	2,256.00	2,784.36	4	98%	0
Oct	3,450.03	3,244.75	3,150.00	94.75	15	60%	4
Nov	2,456.41	2,310.25	3,660.00	-1,349.75	23	10%	17
Dec	2,124.73	1,998.30	3,906.00	-1,907.70	29	2%	24
					125		81

As can be seen from the two tables for certain months even with the luminaire run at 50% for five hours a night the battery has insufficient charge to maintain the luminaire in operation. It should also be noted that the State of Charge (SoC) of the battery is extremely low for these months. This has a knock-on effect as a solar / battery installation has a requirement for two days of self-autonomy and three days of supported nights which clearly can't be achieved. The SoC of a battery is the level of its charge in relation to its capacity- maximum amount of energy it can store. SoC is a ratio between these two values and is therefore expressed as a percentage.

Products utilising both solar PV panels and wind turbines could provide more efficient results when dimming occurs and improve the SoC levels.

Figure 2-8 - Solar PV panel and wind turbine hybrid

3

UNDERSTANDING LIGHTING COLUMNS

3 UNDERSTANDING LIGHTING COLUMNS

Lighting columns are a core asset within CoY that has an even and widespread distribution across the city's urban areas. Over recent years, lighting columns across CoY have been utilised increasingly for purposes other than just supporting the luminaire. Third-party attachments and support have been mounted onto the lighting column, increasing electrical and structural load. These attachments include but are not limited to:

- Data collections sensors and cameras
- Festive decorations
- Wi-Fi, telecommunication enabling equipment
- CCTV equipment
- Digital signage and public communication
- Electric vehicle charging
- Transport optimisation (traffic management and parking)

3.1 STRUCTURAL AND AESTHETIC CONSIDERATIONS

Lighting columns are minor structures and need to be considered as such. They are designed to comply to BS EN 40 Lighting Columns; and are specified by the designer using PD 6547 Guidance on the use of BS EN 40. They must be considered as such when looking to mount any attachment to them. Hence, the inclusion of an energy source and storage onto a lighting column will also be subject to specific structural considerations as per the manufacturer's and CoY's specification. Structural tests may need to be conducted on existing assets as per ILP's GN22, and the column's manufacturer would need to be advised before further attachments are added. This assessment should always be undertaken by a structural engineer. The Institution of Lighting Professionals (ILP) Guidance Note (GN) 12 Smart columns provides guidance on the considerations to be made when looking to any attachment to any column.

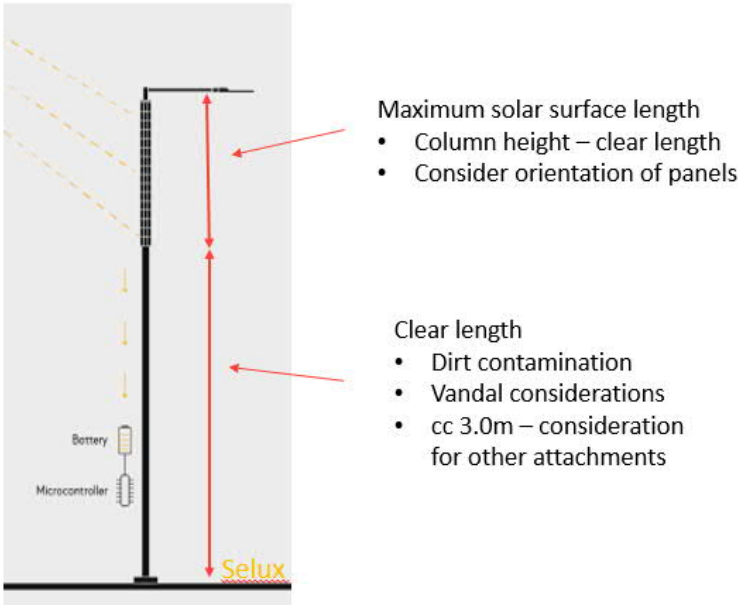
When attachments such as solar PV panels and wind turbines are considered, then due consideration should be given to the daytime aesthetic appearance. For instance, wind turbines may not look aesthetically pleasing on columns located at city centres. Further analysis on the different forms of solar PV panel attachments and wind turbines, and basic definitions of what these assets are, can be seen in section 4.

3.2 MOUNTING HEIGHT CONSIDERATIONS

Due consideration must also be given to where solar PV panel and wind turbine attachments are located on the column. They should always be mounted such that the distance from ground level to base of the array ensures minimal dirt contamination of the array from vehicle spray; and they should be located at a height that reduces vandalism.

Further care needs to be given for any other attachments the column is required to accommodate. The height of the column and these considerations will then dictate the possible size and area of the PV panel and/ or the wind turbine that may be accommodated. Figure 3-1 shows a schematic with further considerations for different mounting heights.

Figure 3-1 - Considerations for mounting height



3.3 ELECTRICAL CONSIDERATIONS

When considering electrical provision to lighting columns with assets that utilise alternative power resources two different types of column connections exist:

- Standalone columns, and
- Hybrid columns.

3.3.1 STANDALONE COLUMNS

A standalone off-grid column can operate as an isolated micro-generation renewable energy and battery storage system. This can be implemented such that the renewable energy system can power both the luminaire and any additional attachments if the environment is suitable.

Operationally, standalone off-grid solutions can have faster deployment and commissioning times than traditional DNO connected solutions.

3.3.2 HYBRID COLUMNS

A hybrid column can offer the flexibility to maintain a reliable and secure energy supply. It can be a solution coupling the DNO supply and renewable energy sources via a changeover interface. Another implementation can be that the renewable energy system can only power additional attachments while the luminaire is powered from the mains thorough DNO supply.

There will be additional space required on the column for controllers and power electronics systems, depending on the preferred implementation. For example, if the hybrid micro-generation supply

agreement permits electricity exporting, space for metering equipment will be required, introducing regular asset maintenance.

In the UK, the use of hybrid columns for street lighting installations is recommended, due to the uneven light distribution through the year. Due to UK climate conditions grid export is not a feasibility, and the design would need to be made in such a way so that the excess energy is not exported to the grid.

4

TECHNOLOGY REVIEW OF ALTERNATIVE POWER PRODUCTS

4 TECHNOLOGY REVIEW OF ALTERNATIVE POWER PRODUCTS

4.1 ALTERNATIVE POWER TECHNOLOGIES

4.1.1 ENERGY GENERATION TECHNOLOGIES

Renewable energy sources such as solar PV panel and small-wind turbines can be integrated into a street lighting column. Including an onboard energy storage solution to a unit which is fed by the grid will add redundancy and flexibility to the installation and resolve the matching 'supply and demand' challenge. This means that the system would have more energy security, since the battery could act as a back-up energy source if there are power cuts, and the grid could supply the power needed if not enough energy is produced by the chosen alternative power technology.

Energy generation technologies include:

- Solar PV panels
- Micro wind
- Small hydro
- Active footways

4.1.1.1 Solar PV panels

Solar PV panels can be implemented as part of a microgrid system or a standalone lighting column system. The two primary semi-conducting materials most widely adopted are crystalline silicon and thin film.

The main types of crystalline silicon panels are monocrystalline and multi-crystalline. Mono-crystalline panels are more efficient and the most expensive on the market compared. Multi-crystalline panels are less efficient, however, they have recently improved. The manufacturing process for crystalline silicon involves extracting silicon from quartz sand at high temperatures. This is the most energy-intensive phase of solar PV panel production, accounting for 60% of the total energy requirement.

Thin-film solar panels are made by placing thin layers of semiconductor material onto various surfaces, usually on glass. They have lower manufacturing costs and are becoming more prevalent as they offer reductions in the carbon footprint. The main types of thin-film technologies used are:

- Cadmium Telluride (CdTe)
    - Solar panels are manufactured on glass.
    - Most cost-effective to manufacture.
    - Panels perform significantly better in high temperatures and low-light conditions.

- Amorphous Silicon
    - Non-crystalline form of silicon
    - Can be deposited in thin layers onto a variety of surfaces
    - Offers lower costs than traditional crystalline silicon; however, it's less efficient at converting sunlight into electricity.

There is a variety of different solar PV panel attachments available for columns which have different forms, and aesthetic properties that may be more suitable for different areas. There are wrap around solar PV panel arrays on the column shaft, circular off-set mounted arrays or horizontal arrays as indicated in figure 4-1.

Figure 4-1 - Off-set array, wrap around array & horizontal array

This characteristic also influences the type of solar PV panel utilised, which can be flexible and ridged. Ridged solar PV panels are rigid, and non-bendable, whereas flexible solar PV panel units can wrap around the column and assume different shapes.

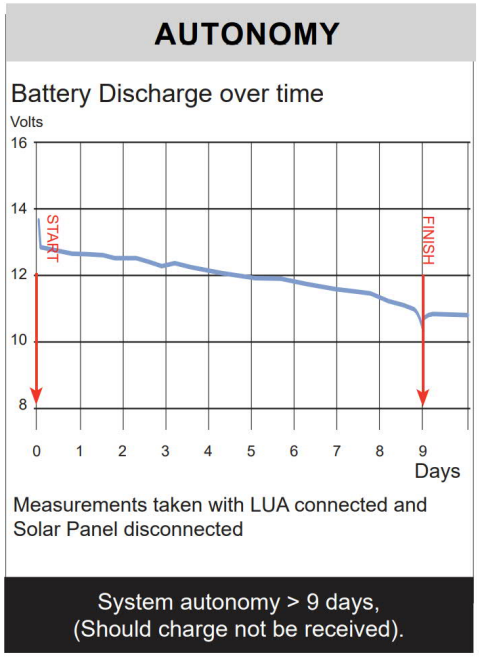
Apart from attachments to columns, lighting units with integrated solar PV panels, and batteries exist, such as Phillips SunStay (figure 4-2). Due consideration to the application of appropriate optics for the road needs to be taken into account. This is a further parameter that will need to be assessed to consider the suitability of the street-lighting asset.

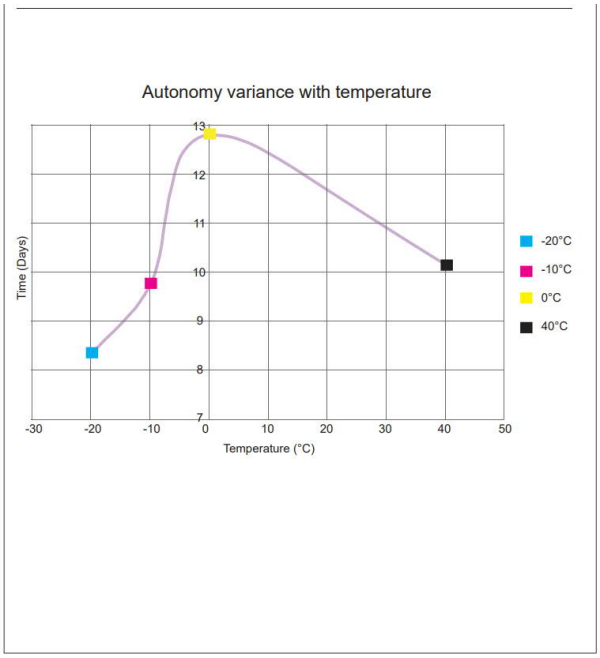
Figure 4-2 – Lighting unit with integrated panels (Philips Sunstay)

There are also other products with integrated solar PV panels such as solar illuminated traffic signs, Bellisa Beacons and school flasher units. Based on the manufacturer's data these products can have autonomy for up to nine days without charging. The following graph (4-3) is taken from

Simmonsigns and shows the autonomy of such a product. It should be noted that care should be taken on the product performance, which may vary based on operating temperature as shown on figure 4-4 provided by Simmonsigns.

Figure 4-3 System autonomy Figure 4-4 - Autonomy variance with temperature





The power generated from solar PV panels can be predicted. However, it is intermittent as the performance of a solar PV panel installation is influenced by the time of day and weather at a specific location, as discussed in section 2.

The power generated is also influenced by the system's effectiveness in converting solar energy to electrical energy. Modules currently in operation typically have an efficiency of between 9% and 22%; however, module performance deteriorates over time. This module degradation can occur at a rate of approximately 0.3% to 1%/year, depending on the module type and local conditions.

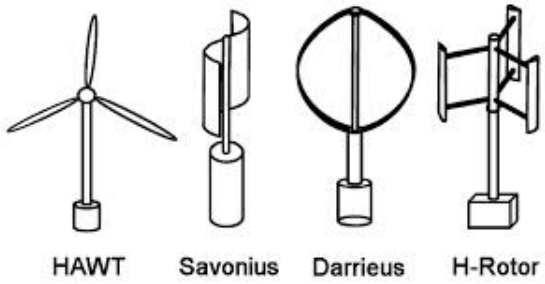
4.1.1.2 Micro-Wind

A micro-wind generation system consists of a small wind turbine, inverter, cabling and distribution equipment. The rotating blades generate electricity, which turns a shaft connected to an electrical generator. Electrical energy is generated as direct current (DC), converted to useable alternating current (AC) by an inverter. Small wind turbines are defined as those that can deliver energy up to 50kW. This definition covers different turbine sizes: horizontal axis (HAVW), and vertical axis (VAWT). Figure 4-5 shows a HAWT turbine and three different types of VAWT turbines.

Small turbines can be installed on or near windy sites to provide an additional source of electrical energy. It can be implemented as a standalone street lighting or grid-connected. A possible implementation might be as part of a renewable hybrid system along with solar PV panel and adequately sized battery storage to cover the issue of intermittency.

Before installing micro wind energy solutions, the additional loading on the lighting column needs to be considered, and the suitability of such a product may be influenced.

Figure 4-5 - Wind turbine types



The electricity generated from wind energy has one of the lowest carbon footprints. Nearly all the emissions occur during the manufacturing and construction phases, arising from the production of steel for the tower/column, concrete for the foundations, and epoxy/fibreglass for the rotor blades Emissions generated during the operation of wind turbines arise from routine maintenance inspection trips which include the use of lubricants and transport.

As has been analysed in section 2, the production of energy with wind turbines is greatly influenced by local geography. Buildings may impact wind flow and can in turn make turbines less efficient.

Wind turbines can also be a source discomfort to people in the local vicinity. They may be considered unaesthetically pleasing and they also produce noise pollution and vibrations nearby.

There's a health and safety concern due to the moving parts of the installation. This would also carry across during maintenance in contrast to static installations such as solar PV panels where there are no moving parts. CoY are rightly proud of their Peregrine Falcons that reside next to the minister building. Turbines would pose a risk to the welfare and wellbeing of these animals should one of them come into contact with a wind turbine.

4.1.1.3 Small-Hydro

Hydroelectric power is generated when hydro turbines convert water pressure into mechanical shaft power, which can be used to drive an electricity generator. Small hydro generation can be classified as:

- Micro-hydro - Power generation of under 100kW or
- Pico hydro - Power generation of under 5kW

The UK Government describes the following three main types of hydroelectric schemes in use in the country:

- **Storage schemes:** A dam impounds water in a reservoir that feeds the turbine and generator, usually located within the dam itself.
- **Run-of-river schemes**; Use the natural flow of a river, where a weir can enhance the continuity of the flow. Both storage and run-of-river schemes can be diversion schemes, where water is channelled from a river, lake or dammed reservoir to a remote powerhouse containing the turbine and generator.
- **Pumped storage**; incorporates two reservoirs. At low demand, generally at night, electricity pumps water from the lower to the upper reservoirs. The water is then released to create power when demand is high. (Not considered renewable energy; however, pumped storage is very good for improving overall energy efficiency.

Small hydro schemes can be very efficient and convenient and can form an excellent long-term investment in a suitable site; however, the upfront cost of hydropower can be high. However, this scheme will be onerous to implement within City of York due to lower flowing water resources. Utilising the River Ouse is regulated and will be subject to the Environmental Agency licensing.

4.1.1.4 Active footways (Kinetic pavements and roads)

Active footways generate electricity by absorbing kinetic energy induced on specialised pavements and roads through walking, and vehicular movement. The absorbed energy is stored in batteries or utilised to supply street lighting or electrical items within the urban environment. This technology can be used as an off-grid solution. Currently, the technology is developing and is not as powerful as conventional electricity sources.

As of now this technology has been used to supply electricity to local illuminated art works, with products such as Pavegen available in the market for interactive applications.

4.1.1.5 Energy generation technologies summary

The following table provides a summary of the technologies discussed above.

Table 4-1 - Energy generation technology

Technology	Advantages	Disadvantage
Solar PV panels	• Predictable power generation (long term). • Low initial capital investment • Low maintenance- self-cleaning. (However batteries would still require cyclical maintenance) • Broad PV supply chain	• Intermittency (short term)- Due to UK climate and duration limits to diurnal generation of night the system will not be able to regularly produce enough energy. • Carbon intensive crystalline silicon manufacturing process.
Micro-Wind	• Predictable power generation (long term). • Low overall carbon footprint. • Electricity production possible overnight.	• Structural limitations on columns. • Routine maintenance and inspections due to moving parts. • Noise. • Safety.
Small-Hydro	• Predictable power generation (long term). • Electricity production at all times of the day.	• Flow may be seasonal. • High capital cost. • Must be near a river with a good head/ source. • Periodic maintenance is required.
Kinetic footways and roads	• Predictable power generation (long term). • Potential for interactive applications which can raise CoY's profile and raise awareness on Carbon issues	• High costs. • The technology is developing and is not as powerful as conventional electricity sources.

4.1.2 ENERGY STORAGE TECHNOLOGIES

The most common type of energy storage that can be used is batteries. Battery technologies have rapidly evolved over the past ten years, and a variation of solutions exist with different advantages and disadvantages. The lighting industry currently use in commercial volumes two basic types of battery: Pb Gel-mat and Lithium-Ion batteries.

Pb Gel-mat batteries have a low initial cost, can offer wide operating parameters, are highly recyclable and can trickle charge at all temperatures. However, they have a lower cycle capacity compared to Lithium-Ion batteries and weight more than Lithium-Ion batteries.

On the contrary, Lithium-Ion batteries have a high initial cost, a poor charge rate at lower temperatures, and they are not highly recyclable. They have a higher cycle capacity compared to Pb Gel-mat batteries and weight less than Gel-mat batteries.

Other types of batteries that exist are Lead Acid batteries, AGM (Absorbent Glass Mat), and Ni-cad. Figure 4-6 shows a comparison of battery technologies conducted by Simmonsigns.

Figure 4-6 - Comparison of battery types

BATTERY	Lead Acid	Gel	AGM 	Lithium	Ni-cad
Product Life span (Years)	2 - 3	2 - 4	8 - 12	5 - 6	4 - 5
Temperature Range	-18°C to 45°C	-18°C to 50°C	-40°C to 65°C	-20°C to 65°C	-20°C to 65°C
No. Discharge Cycles @80%	450	500	1500	1300	1100
Transportation Safety	Medium Risk	Low risk	No Risk	High Risk	Medium Risk

Further consideration on energy storage technologies, and alternative technologies to batteries is summarised in table 4-2.

Table 4-2 - Energy storage technology

Technology	Advantages	Disadvantage
Battery Energy Storage	• Scalable and can be installed either at point of generation or end-use. • Batteries could be used individually in micro-grids to balance variable decentralised energy sources or within individual lighting columns.	• Cooling, batteries have a tight environmental tolerance in relation to heat. • Environment, embedded carbon and green credentials. – not environmentally friendly manufacturing processes • Potential for issues associated with overheating. • Negative effects of overcharging/over-discharging.
Pumped Hydro Energy Storage (A pump stores water from the head of a river to a water reserve when there is low demand for energy. When electricity is more expensive, or there is a peak of demand, energy is released back by releasing water back to the river again)	• Its utility-scale technology can be used to balance variable large scale renewable resources (e.g. wind). • Rapid response time can help meet peak loads or sudden changes in demand. • Large power and energy capacity.	• They are geographically constrained away from demand centres.
Hydrogen Energy Storage (Energy is stored by electrolysing water to produce hydrogen and oxygen)	• Only emissions at the point of use are water vapours. • Stored hydrogen can be used any time without self-discharge. • Can be transported from the point of production to the point of demand if required.	• Fuel cell technologies are currently expensive. • There are potential safety concerns over the storage of hydrogen.
Super Capacitors Energy Storage (Energy is stored as an electric charge between two plates within the capacitor)	• Suitable for high current loads. • Extremely rapid cycle times.	• Currently expensive. • Unsuitable for long term storage solutions due to self-discharge.

4.2 AVAILABLE PRODUCTS IN THE MARKET

We conducted a review of available street lighting products which was issued in May 2022. Through the review, a product register was compiled from manufacturers' datasheets. The following observations were summarised from the product register:

- LiFePO4 Lithium batteries are the most common technology utilised by manufacturers.
- There exist some column mounted solutions having a luminaire with integrated generation and storage components.

- The market and product research concluded that solar PV panels and Wind/ PV panel hybrids with battery storage dominate the current market.

We also produced a questionnaire and sent it out to a shortlist of manufacturers to compare alternative power supply solutions. This helped us gather further information on the viability of products and technical implementations of solutions currently available on the market. The following points can be summarised from the survey:

- Most products and components are manufactured in mainland Europe and China. Some companies, such as Knight Off grid solutions, have product assembly factories in the UK, while key components are sourced and manufactured in China.
- Typical lead times are between 4 and 8 weeks, depending on the product. However, due to global material shortages and pandemic induced supply chain issues, most manufacturers advise lead times at the point of making enquiries. The increases in energy costs coupled with increasing inflation have also influenced the cost of manufacturing, delivery, installation and maintenance of electronic and electrical components and equipment.
- Though installation is typically not in the scope for most manufacturers, some responded that no special or extra equipment is required. Benefits for installation include no trenching associated costs for standalone off-grid column solutions. Pre-assembled solutions stated fewer installation times onsite.
- Concerning maintenance, a lesser unit maintenance regime is required, since rain can be utilised to wash/self-clean the solar PV panel holder. The batteries would require a cyclical replacement.
- The longevity of the products tends to consist of 20 to 25 years of designed life expectancy with 5 years of the manufacturer’s warranty. The installations can be suitably specified for most external environments.
- Manufacturers seemed to be pushing for carbon neutral materials and were aiming on utilising locally sourced materials
- WEEE certified recycling company can recycle the assemblies at the end of life. Lithium batteries cannot be recycled that way.

5

SUMMARY OF ASSET EQUIPMENT INVENTORIES

5 SUMMARY OF ASSET EQUIPMENT INVENTORIES

5.1 CITY OF YORK LIGHTING INVENTORY

A high-level analysis of the lighting inventory for City of York dated May 2022 was initially carried out. The study revealed that most of the lighting assets are Street Lighting (Figure 5-1). A table with assumed meanings of the column unit type acronyms can be seen in Appendix A.

Figure 5-1 - Unit Type

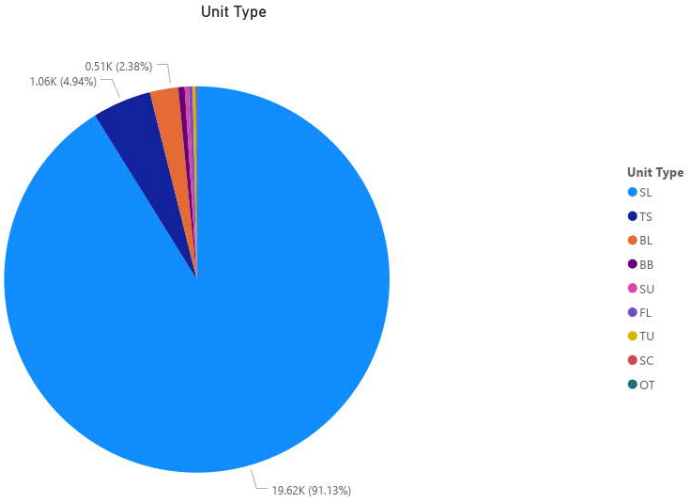


Figure 5-2 illustrates that approximately 60% of all unit types are LEDs. The analysis on the distribution of lamp types on street lighting units produces similar results for LEDs, with approximately 65% of the streetlighting assets utilising this technology.

Figure 5-2 - Lamp Type

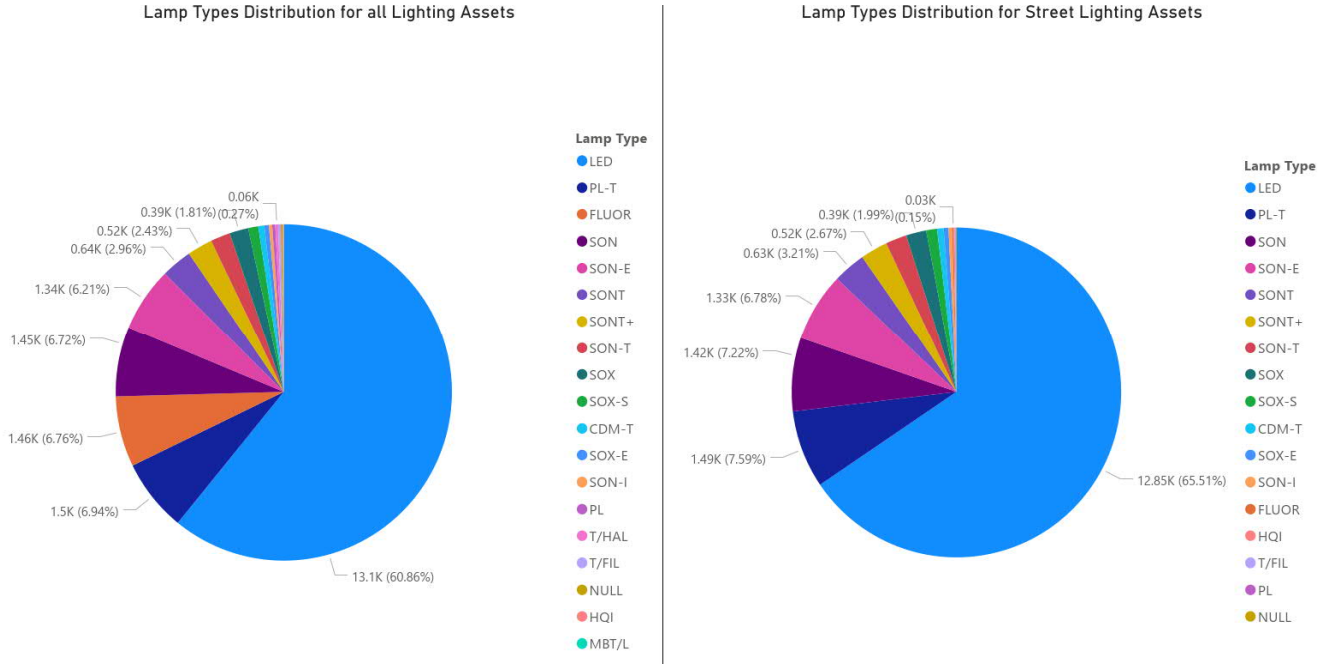


Figure 5-3 shows the percentage split of LED street lighting units by height. It indicates that most of the mounting heights are five to eight metres high. Approximately 80% of the columns are galvanised steel. Some street lighting assets are wall-mounted, meaning that their column material appears as null. 3.61% of all the SL assets are wall mounted. Out of these, 1.65% LED streetlighting units are wall mounted. A table with assumed meanings of the column material acronyms can be seen in Appendix A.

Figure 5-3 - Street Lighting by Height and Material

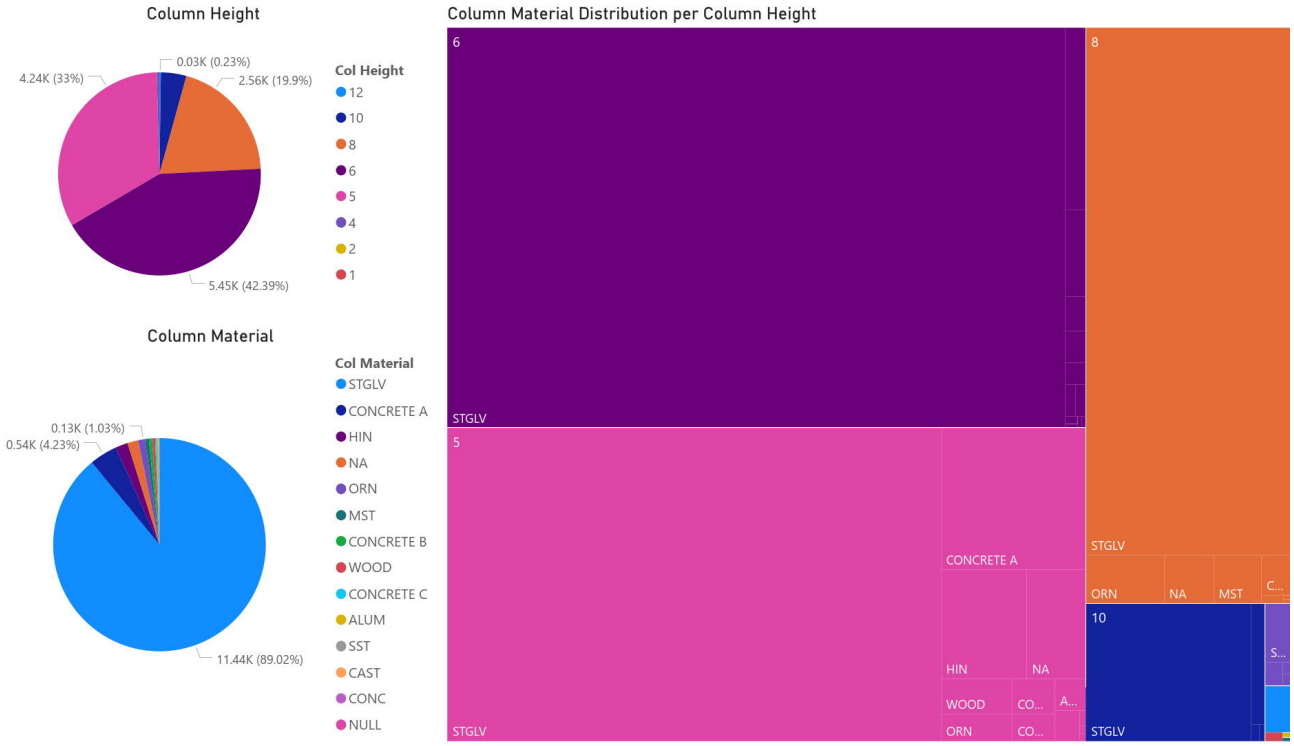
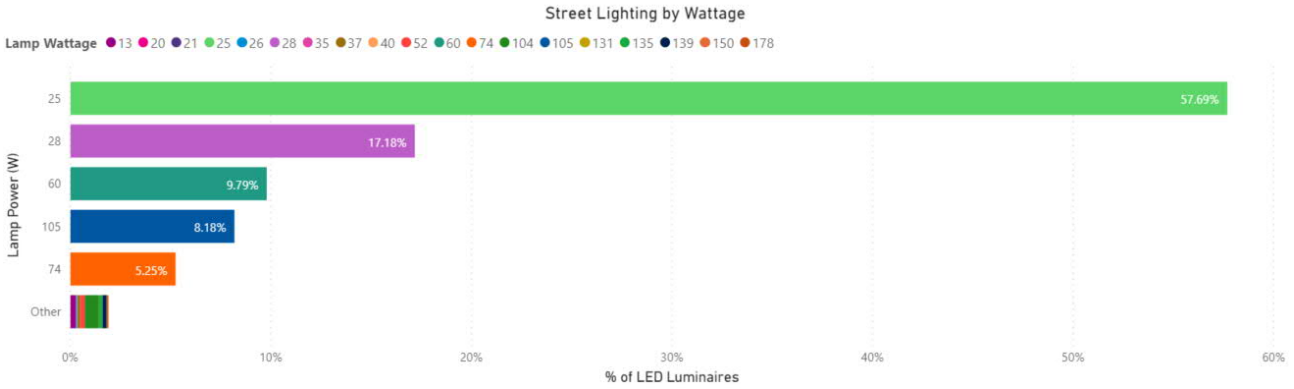


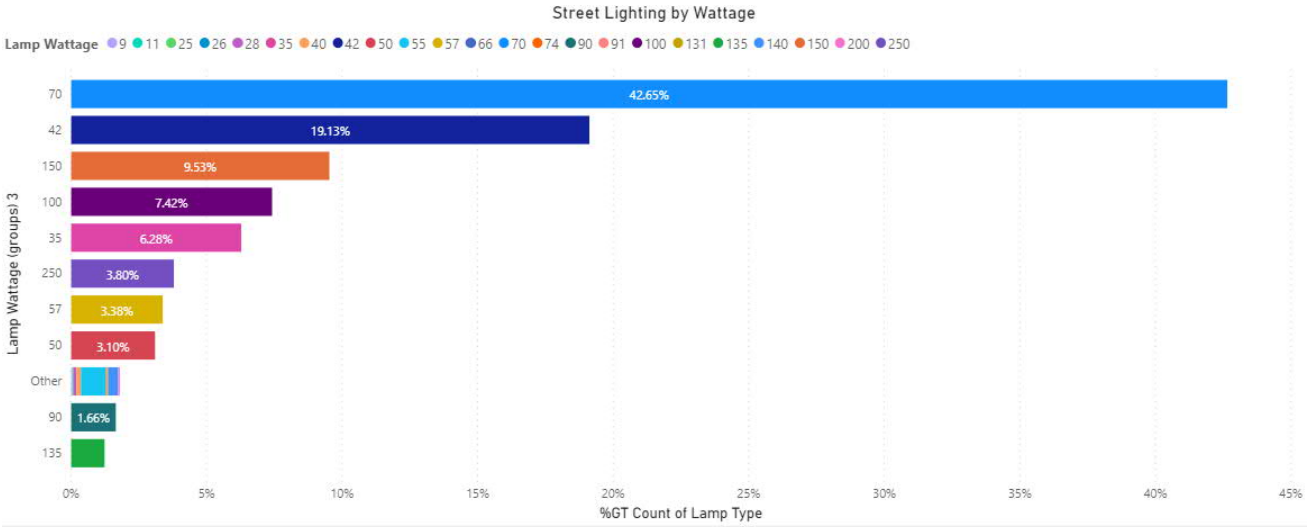
Figure 5-4. shows the percentage split of LED street lighting by wattage. It indicates that almost 60% of the units installed are 25W. Almost 20% of the units are 28W, and approximately 20% of the units are 60W or 105W. A few lamp wattage groups were below 1% of the assets available and were grouped together to aid the visual acuity of the graph provided. These highly vary in Wattage.

Figure 5-4 – LED Street Lighting by Wattage



The following figure highlights that most non-LED Street Lighting units use more power than the LED units. Approximately 40% of the units are 70W, and almost 20% of the units are 42W.

Figure 5-5 - Other Street Lighting by Wattage



The analysis indicates that the most significant opportunity for any impact lies within LED street lighting units, although solutions investigated in this report can be adopted for other lighting functions. Power supply solutions will need to cater to a streetlamp wattage of at least 25W to be viable as an alternative to what currently exists within the City of York.

Some concerns with the analysis lie on the fact that a lot of units are not converted to LED, and some of the required wattages of the units are relatively high. Further considerations for updating the lighting assets to LED units may need to be undertaken.

Some further concerns can be raised due to the height of the majority of the street lighting columns. Most of them are five and six metres high. Solar PV panel solutions installed on five metre columns are unlikely to be able to provide sufficient clearance from the ground and be large enough to produce sufficient energy for the lighting units. Separate horizontal arrays could be considered for these assets, but the added weight and windage would make these solutions hard to be adapted to these kinds of assets. Alternatively, units with integrated solar panels can be considered for 5m columns if the optics and flux levels of the units can be utilised to produce appropriate lighting designs.

6

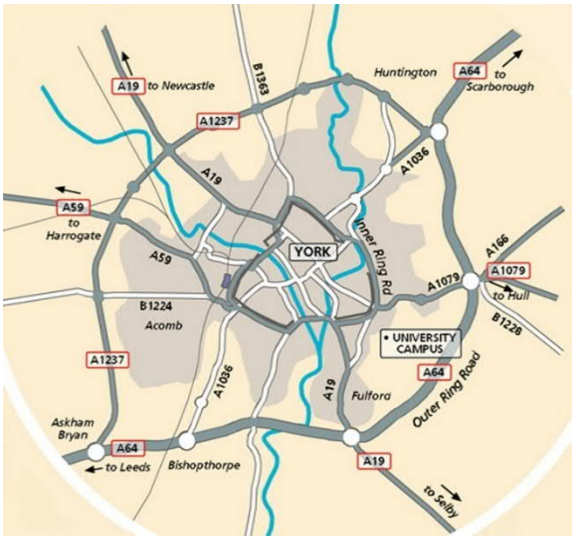
VIABILITY OF THIS TECHNOLOGY IN CITY OF YORK

6 VIABILITY OF THIS TECHNOLOGY IN CITY OF YORK

6.1 DAYLIGHT CONSIDERATIONS IN CITY OF YORK

York is a medieval walled city located in northeast England. The city has got a historic conservation core, and spreads outwards towards further residential areas.

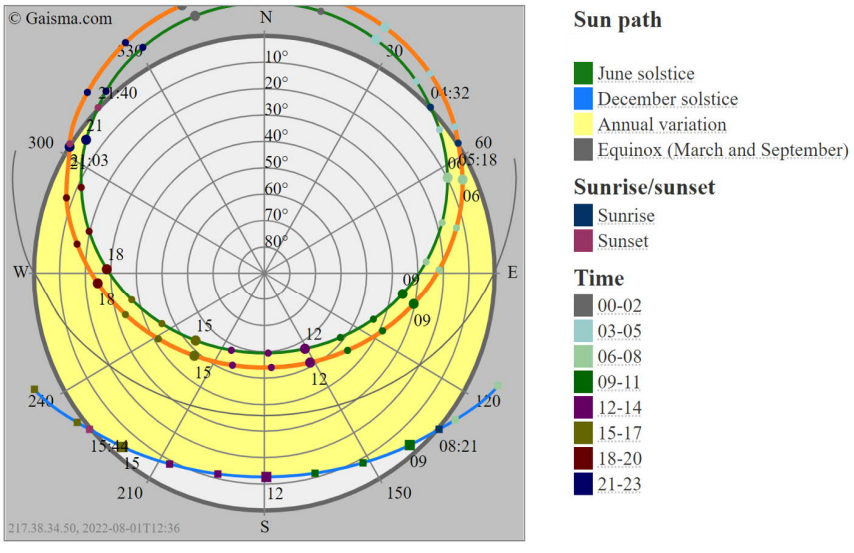
Figure 6-1 - York



The historic core of the city is surrounded by an internal ring road which is connected to A-roads. The river Ouse crosses the city, and various parks exist in the centre and on further locations.

The areas within most of the city's vicinity are urban, and therefore direct sunlight to potential solar panel locations can be blocked by shade from surrounding buildings. This means that the amount of energy produced on solar PV panels will be typically less than expected based on the sun-availability in York through the year.

Figure 6-2 - Sun path diagram for York



Notes: • = Daylight saving time, * = Next day.

Based on the morphology of the city, we have recognised four types of areas which can be found within the city's vicinity. The viability of Solar Lighting will be considered for each of the defined sections. These are:

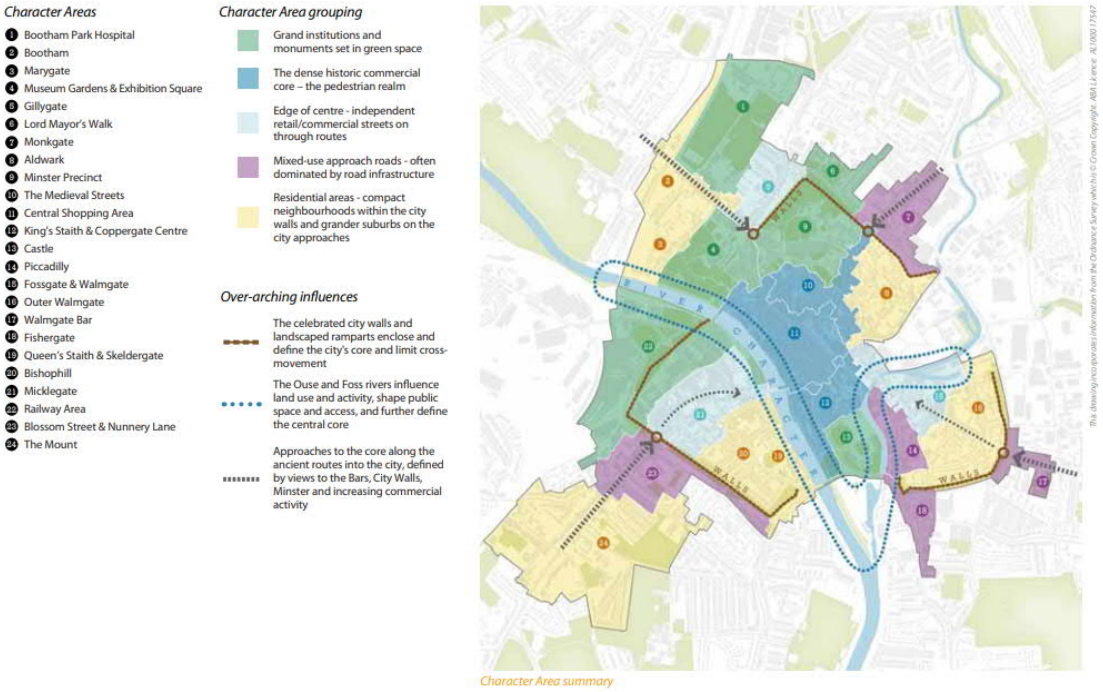
1. Historic core of the city
2. Network of larger roads
3. Surrounding residential areas
4. Parks

6.1.1 HISTORIC CORE OF THE CITY

Morphology of the area and lighting requirements

The centre of York is a listed historic area and an area of archaeological importance. Figure 6-3[5] shows an annotated map with areas of historic importance.

Figure 6-3 - Map of York's Areas of Archeological Importance

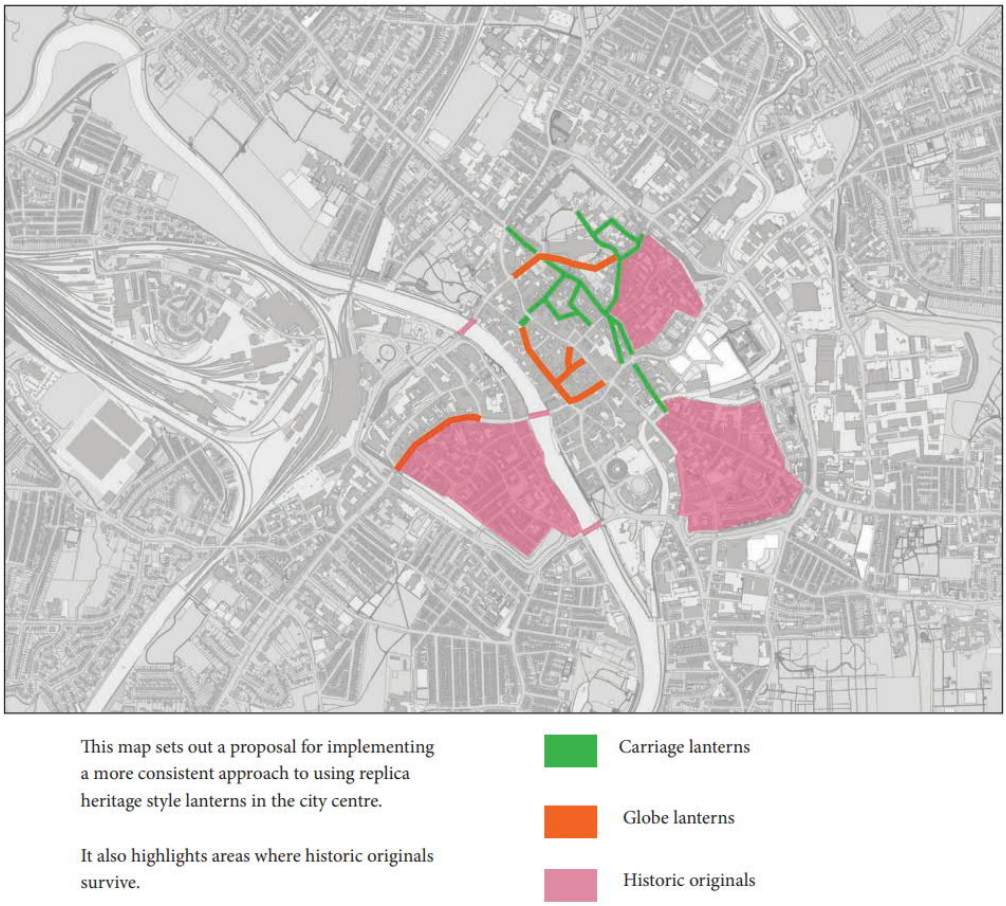


According to the Streetscape Strategy and Guidance of CoY[6], the lighting needs to play a prominent role in enhancing local distinctiveness and make a positive contribution to the city's character. Luminaires on historic streets need to be wall mounted and be of an appropriate heritage lanterns style. Figure 6-4[2] shows a proposal of historic lantern areas.

[5] https://www.york.gov.uk/downloads/file/1732/sd104-york-central-historic-core-conservation-area-appraisal-2011-

[6] sd109-city-of-york-streetscape-strategy-and-guidance-2014-

Figure 6-4 - Historic lantern areas



Viability of solar lighting in the area

Due to the mounting position of the street lighting units at the centre of York, the conservation area rules, and the high amount of shading on narrow roads related to the size of surrounding buildings; it would not be viable to convert these areas to solar lighting, unless alternatives for producing heritage lanterns with integrated solar PV panels is explored with the products' manufacturers.

6.1.2 LARGER ROADS NETWORK

Morphology of the area and lighting requirements

For the purpose of this report, the "Larger roads network" is defined as the city's inner ring road, and A-roads. These would be expected to be classified as Principle- M-type roads for lighting assessments, as defined in BS EN 13202-2 Road Lighting Part 2: Performance Requirements, and tend to be faster roads with the potential of having multiple lanes. Taller columns tend to be used on this type of road, with eight and ten metre columns being quite common in lighting designs. In CoY's inventory it is advised that there are a few 12m columns, some 10m columns and then more 8m columns in the city's vicinity, and a big percentage of these would be expected to be in the "Larger roads network" area. The luminaires used in York on this network tend to be different from the ones used in the historic core, with functional luminaires being the preference over heritage style lanterns.

Due to the width, location of these roads, and the height of the columns used, shading from adjacent buildings would have a smaller impact on the columns.

Figure 6-5 - Google maps caption of York and larger roads network

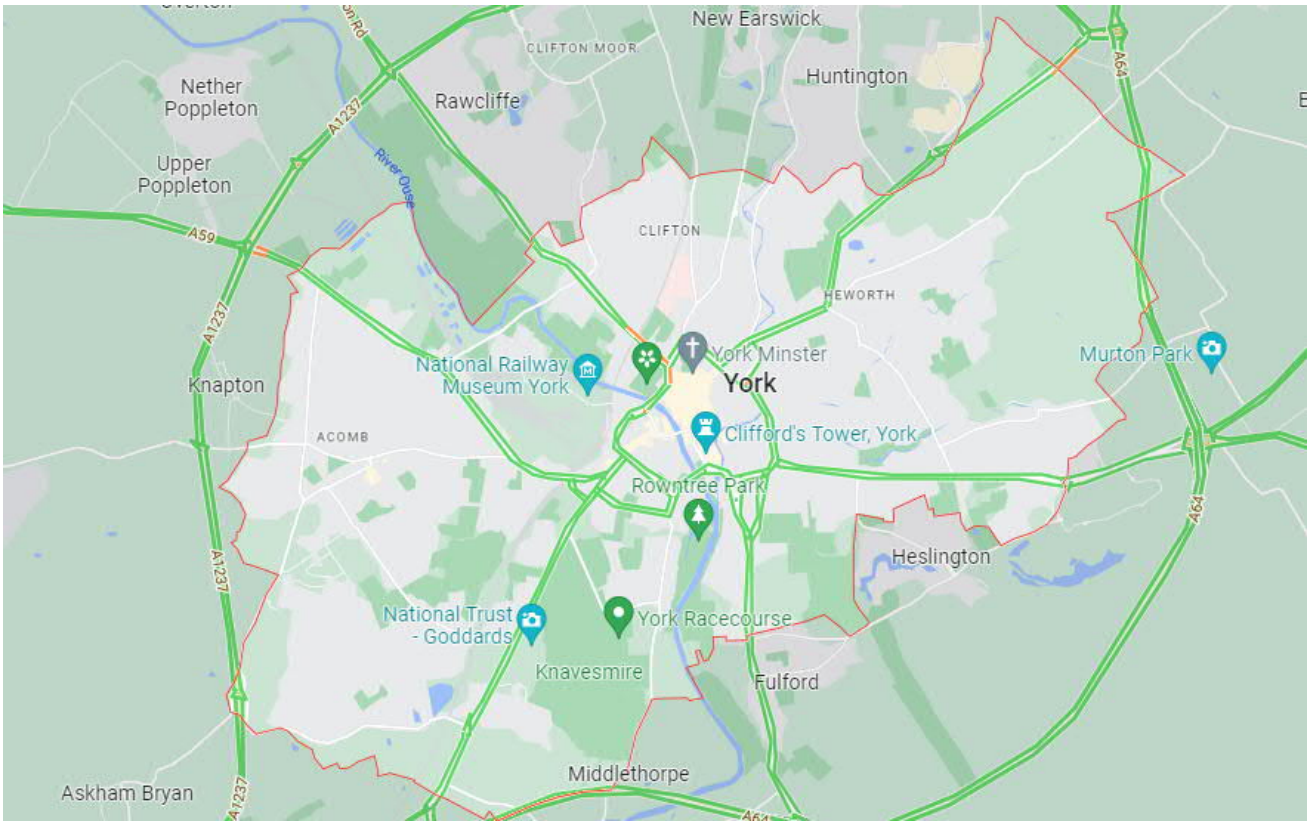


Figure 6-6 - Snapshot of street-view on an A-Road in York

Viability of solar lighting in the area

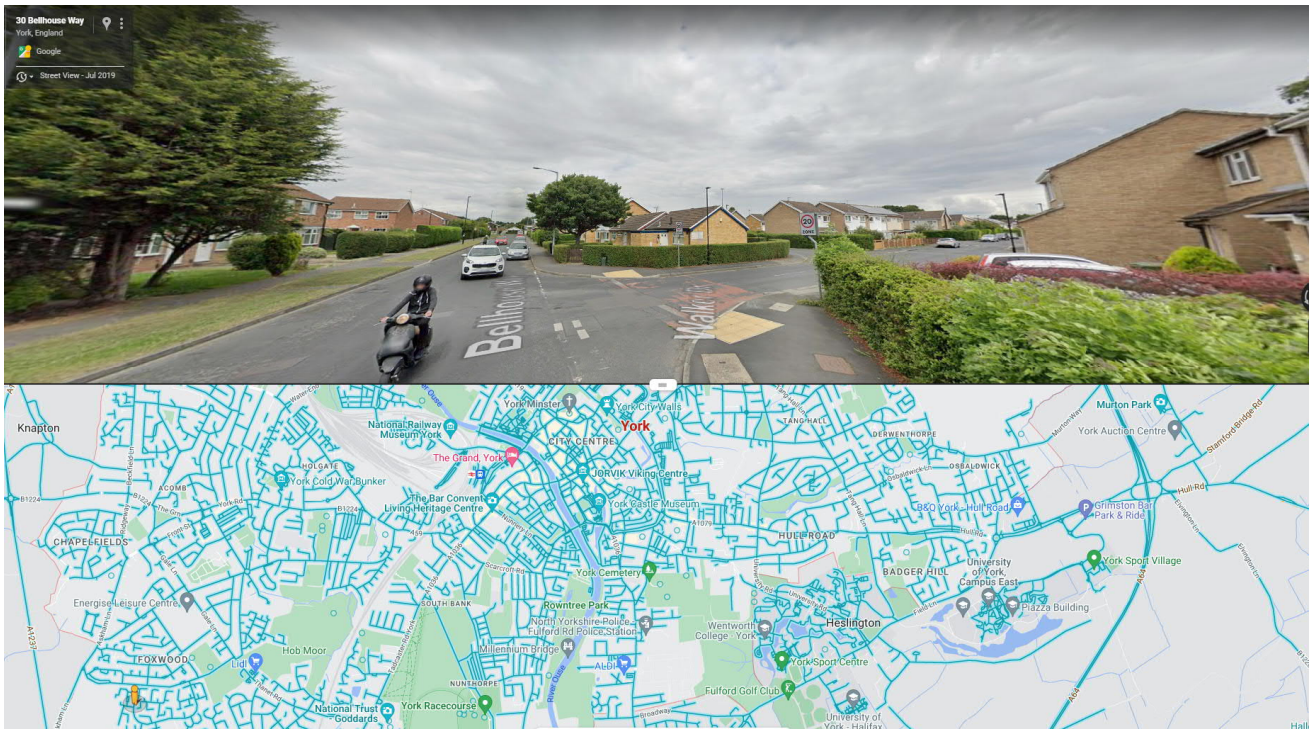
Due to the type of units used and the column heights, offset or wrap-around solar PV panel arrays would be aesthetically appropriate. The column heights would allow a sufficient safety distance from the ground. However, a drawback of these units is that the luminaires on Principle- M-type roads are of a higher wattage to provide sufficient levels of illumination. Solar PV panel units would not be able to produce and store sufficient power for these assets, and therefore a standalone solution would not be appropriate. A hybrid solution should therefore be considered.

6.1.3 SURROUNDING RESIDENTIAL AREAS

Morphology of the area and lighting requirements

The surrounding residential areas consist of wider roads than the ones seen in similar areas of the historic core of the city. The lighting columns tend to be five to six metres tall in minor roads, and six to eight metres tall in circulatory roads. Modern-looking units are used in these areas.

Figure 6-7 - Snapshot of a residential area outside York's centre



Viability of solar lighting in the area

These areas are not subject to historic or heritage status, and the lighting units used tend to require less power to operate compared to the units on the larger roads network. What's more, the buildings in these areas are not very tall, meaning that less shadowing is likely to occur.

However, due to the height of the columns, there would be less energy generation potential since there would be less solar PV panel material as discussed in section 3 to implement wrap-around and offset columns. Utilising horizontal array solar panels on top of the columns would cause

aesthetic concerns with residents, and structural issues with the columns due to increased weight and windage. An alternative solution would be to consider lighting units with an included solar panel on them as discussed in section 4.

6.1.4 PARKS

Morphology of the area and lighting requirements

York has parks scattered across its centre and outer areas. Through a desktop survey, it was classified that the green areas within the centre of York appear to be lit with historic units of low height (less than six metres); whereas the park areas on the outskirts of the city tend to be unlit.

Viability of solar lighting in the area

Due to the heritage nature of the parks in central York, and the low heights of the columns, it would not be appropriate to instal solar PV panels on lighting columns. There may exist the possibility to include heritage fittings with integral solar PV panels. The manufacturer of the heritage fittings used would need to be contacted to explore the feasibility of producing such a fitting.

6.2 COLUMN MATERIAL LIMITATIONS

Further limitations on the installation of Solar PV panels on street lighting assets may occur due to the material of the lighting column. Steel and aluminium columns may be appropriate for installation of further attachments, but materials such as concrete and cast iron would not be appropriate for consideration. Steel and Aluminium columns would need to get structurally tested as per ILP's GN22 and the windage and weight allowance of the columns would need to be revised before installation of further assets is considered.

7

SUMMARY OF RETURN OF INVESTMENT POTENTIAL AND ECOLOGICAL IMPACT OF INSTALATIONS

7 SUMMARY OF RETURN OF INVESTMENT POTENTIAL AND ECOLOGICAL IMPACT OF INSTALATIONS

The analysis conducted on sections 5 and 6 highlight that solar energy is not likely to provide high investment returns in most areas of York. The street lighting assets of historic areas of the city cannot be easily adapted to include solar PV panels due to their mounting and restrictions related to conservation of the historic character of the city. This means that if the drive for updating units is fiscal, then the option may be limited depending upon the column height and luminaire wattage.

However, it should be important to note that when it comes to the NetZero / Carbon agenda that economic justification will be more difficult to show. The primary agenda driving this switch is climate and not fiscal.

In order to consider an appropriate way for reviewing the investment potential of the installations and their carbon savings, the main investigative approach of this report needs to be analysed first.

7.1 MAIN INVESTIGATIVE APPROACH OF THE REPORT

7.1.1 ELECTRICAL CONNECTIONS

Given the fact that the survey results provided by Kight Off Grid show that the proposed system cannot provide sufficient energy for a 24W luminaire (figures 2-4 and 2-5), it can be concluded that the potential energy generation for the majority of street lighting assets within York would not be sufficient, since most units require more than 24W to operate (as illustrated in figures 5-4 and 5-5). Significant levels of grid electricity may be required during the darker months of the year for the units illuminating larger roads with higher lighting class requirements and taller lighting columns.

Based on the above, the main investigative approach of the report has been the use of hybrid solar and DNO supplies. A hybrid solution for street lighting assets would be the recommended solution for most residential and larger roads to ensure sufficient power will be available in winter months to ensure roads are continued to be lit to the required level.

Where the guarantee of lighting levels are not critical, and a strict dimming regime can be used during the times of low/no occupancy - for example footpaths and park lighting - then a standalone solar/wind solution could be viable pending a more extensive evaluation. Such installations would involve a small percentage of the lighting assets for CoY and may include:

- Alternative installations like the solar illuminated traffic signs, Bellisa Beacons and school flasher units shown in section 4.1.1.1 which can be used as a political statement and an aid for fulfilling CoY’s 2030 Net Zero goal.
- Stand-alone lighting columns for parks and smaller cul-de-sac areas in which availability of lighting supply is not critical.

7.1.2 TYPE OF SOLAR PANEL AND WIND TURBINES RECOMMENDED

The main focus of the proposals has been on vertical solar panels due to their aesthetic appearance. Additionally, retrofitted columns are more likely to be able to structurally support vertical rather than horizontal panels since less stress and windage is added on the assets.

The use of micro wind turbines would not be recommended in York due to move parts creating a hazard to both human and avian wildlife and further technical concerns of the use of these assets. Our initial conclusions are that for wind to be viable a clean path of un-turbulent wind is usually required. Typically, city centres and build up areas disrupt the wind to a degree where it is not viable.

Residential areas are more likely to achieve a viable wind solution. However, a strong chance of objections from residents citing a noise nuisance may exist.

Wind options would be best suited to unpopulated and open environments, for example parks.

7.1.3 COLUMN HEIGHT

Columns which are as tall or taller than eight metres are deemed as sufficiently sized for the use of vertical/ wrap-around solar panels. The amount of solar array on the column less than eight metres is very small as it needs to start from around 2.5 to 3m above ground level which only then provides circa 2m of panel length. According to different manufacturers who were contacted during the 2022 Light + Building exhibition, an 8m column with 5m of array could run a 30W luminaire for 8 months in the year, the remaining four months would require a DNO supply to keep it operating, even if a dimming profile was applied during hours when there is little activity. Typically however, Eight metre columns tend to be too tall for residential areas so are rarely specified in these locations. For a stand-off array or an array integrated into a luminaire itself the column height does not impact viability other than ensuring it is structurally suitable and tall enough as that a solar PV array does not introduce other risks/hazards e.g. vandalism.

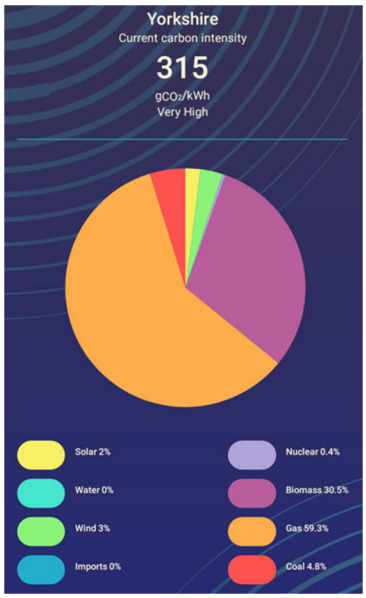
7.2 CLIMATE CONSIDERATIONS AND CO_2 SAVINGS

Its important to acknowledge that energy from the DNO does not always mean ‘dirty’ energy with a large CO_2 footprint. The UK at a national level is increasingly improving the amount of energy from green or renewable sources which should not be ignored.

The national grid provides almost live figures in terms of grams of CO_2 released for every kWh generated - this is variable depending on climatic and economic factors. For 11/10/2022 at 11:00 this was for a national average 264gCO_2/kWh but for the Yorkshire region itself this was higher at 315gCO_2/kWh seemingly due to very low contributions from solar (2%) and wind (3%) and a high contribution from gas (60%) (figure 7-1).

Therefore, a CO_2 saving could be calculated based on an average gCO_2/kWh figure and using the historical data for energy demand for CoY Street lighting and then assuming % generation from renewable sources.

Figure 7-1 - Carbon intensity in Yorkshire on 11/10/2022 at 11:00

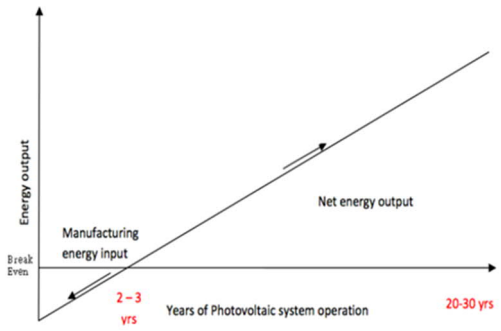


When considering the carbon cost of a solution the energy savings are not the only thing that needs to be considered. Factors such as the production of materials, manufacturing of the product, transport, installation, maintenance and decommission will incur additional carbon impacts. Hence the energy savings and their impact on overall carbon intensity would need to reach a break-even point with all the carbon costs described above before any CO_2 gains occur.

The returns of energy and carbon costs for solar panels vary depending on where the panels are produced and used. A study has shown that the payback period of crystalline solar PV panels was about 2.5 years. Saying that, the climate and production area could influence this figure drastically. - in northern UK, a typical solar panel is expected to take around 6 years to pay back its energy cost.[7]

Figure 7-2 is an indicative plan on how we would expect this to work.

Figure 7-2 - Break-even point for CO2 costs of solar panels



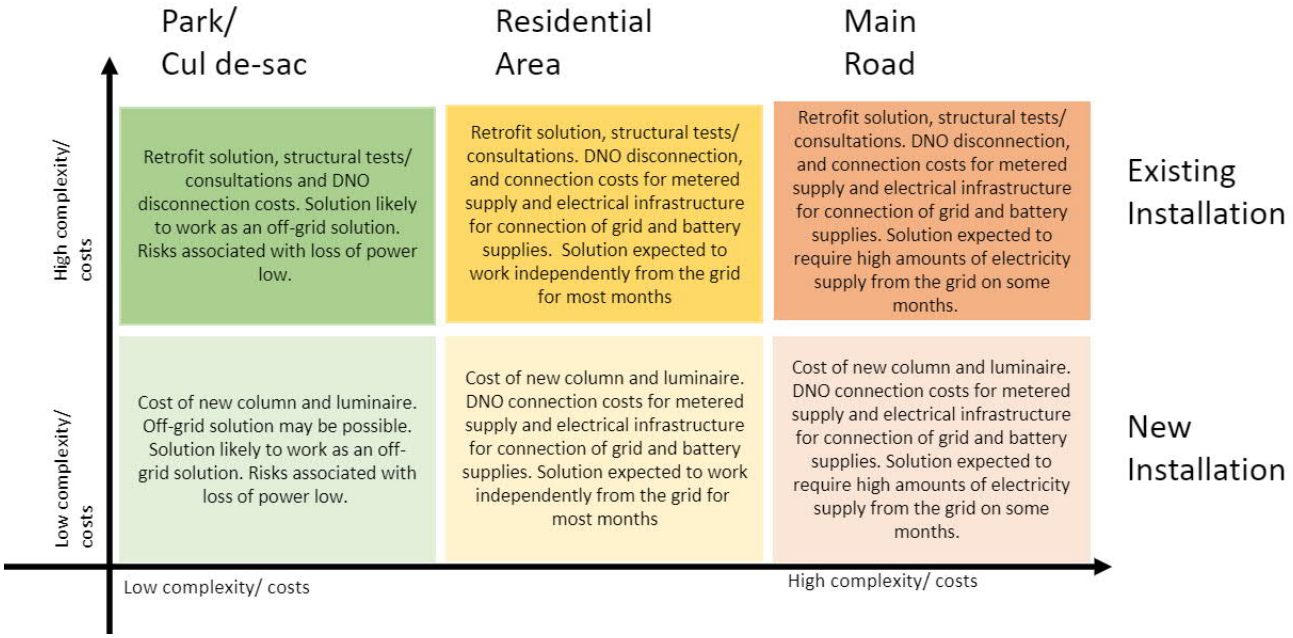
[7] https://www.renewableenergyhub.co.uk/main/solar-panels/solar-panels-carbon-analysis/

7.3 FISCAL RETURN OF INVESTMENT POTENTIAL

A fiscal analysis is hard to be conducted due to the number of parameters that need to be considered and the constant flux of price changes at the current economic climate.

The return of investment potentials can be influenced by the type of area and whether a new or existing installation will be assessed. The complexity of using alternative power solutions is higher on main roads and residential roads than on parks and areas where hybrid solutions are not necessary. New installations may incur less challenges and less fiscal risks and costs in comparison with converting existing installations. Figure 7-3 highlights a non-exhaustive list of influencing factors for a fiscal analysis for different types of installations.

Figure 7-3 - Risks and costs parameters associated with different types of streetlighting installations



A full economic analysis of different solutions and scenarios like the ones described above is not feasible due to the variation of factors which need to be considered and current financial and political instability and constant rate of inflation. A basic analysis on some solutions provided has been conducted to help estimate approximate costs and compare them with installing a normal streetlighting column (Appendix B). This analysis covers a span of 25 years which is the expected lifetime of a street lighting installation. Multiple assumptions are associated with the pricings provided. These have been listed in Appendix B.

8

CONCLUSIONS AND RECOMMENDATIONS

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 CONCLUSION

The adoption and uptake of alternative energy technologies for public lighting within CoY will be influenced by:

- Increasing grid-supplied electricity prices,
- Decreasing technology costs,
- Achieving economies of scale,
- Carbon emission reduction targets,
- Air pollution concerns; and energy security concerns, and
- Additional powered attachments using light column power such as Wi-Fi and EV charging.

The general rise of energy costs, and the increasing demand of electricity at night due to the uptake of electric vehicles and growing telecommunications infrastructure is increasing off-peak electricity costs.

Having a more significant share of street lighting supplied by low carbon sources can reduce greenhouse gas emissions associated with energy supply. Within the street lighting environment, the 'energy trilemma' may be solved by adopting renewable energy sources that are more flexible, responsive, and decentralised. However, this may also increase the complexity of the energy supply systems and their cost.

8.1.1 CURRENT LIMITATIONS ON TECHNOLOGIES

Even though alternative power sources to street lighting within CoY have the potential to reduce the overall carbon footprint of the installation, most standalone street lighting column solutions have a lower lamp rating compared to the bulk of York's Street lighting assets. What's more if these are used as off-grid solar only solutions, they highly depend on dimming regimes and sensors to maintain enough power resources to work on the winter months in UK. These solutions come in with additional costs and risks of not working, and making pedestrians perceive the environment as unsafe.

Currently, the popular and different variations of lithium-Ion batteries come with environmental concerns and embedded carbon issues. Recent innovations and improvements in battery technologies with increased energy density haven't filtered through to the street lighting products assessed.

A further risk related to compliance is that not all the complete solutions including luminaires are photometrically tested meaning that compliance with standards on lighting levels for safety and environmental concerns cannot be reached.

8.1.2 LEGAL CONSIDERATIONS

It should be stressed that councils are not legally bound to provide lighting on roads. A Highway Authority has a power and not a duty to provide lighting as per the Highways Act 1980. However,

Section 17 of the Crime and Disorder Act 1988 requires that safety dimension of all work is considered. Should any death occur, then the incident will be investigated by the police under the Road Death Investigation Manual. This requires an investigation of the road infrastructure and its compliance with relevant standards. Failure to do so could lead the local authority being legally challenged. Hence it is important to consider the lighting standards and relevant guidance documents and provide sufficient lighting levels, or risk assess properly before lighting is removed or dimmed down. Uniformity levels are considered of higher importance than illuminance levels on a road based on current research from Professor Steve Fotios at Sheffield University.

8.1.3 FINAL CONCLUSIONS

It should be noted that based on our findings that these technologies are not yet ready for anything other than footway and park lighting. In these types of installations there needs to be a control system that dims the lighting down when people are not about and then brings it back up in section when people wish to use the path – for other applications where the availability of supply is important it is just not ready for application and economically viable.

It should be noted that technologies related to alternative power solutions are rapidly evolving, and it is highly probable that future product designs and research will make the solutions discussed viable in UK within the next few years.

8.2 RECOMMENDATIONS

As shown on section 5, SL assets are the bulk of the managed assets in York. Only 60% of these are LED units. Converting the rest of the units to LED will have the potential for further energy savings and may make the installation of hybrid solar systems more viable once technologies advance in the future.

Even though illuminated traffic signs, Bellisa Beacons and school flasher units account for less than 1% of the lighting assets, the available technologies in the market seem to be able to provide viable solutions for these systems, which could be used as an aid in helping York achieving its net zero carbon goals.

It is also recommended that CoY should consider commencing a solar trial to explore real world performance and provide assurance around availability of supply. As suggested in section 8.1, a park in a low-crime area would be an appropriate scenario to test the solution and its feasibility and performance in York.

Further future appraisals of the market may be necessary to stay informed about market development and appraise when technologies become suitable for UK use.

Appendix A

UNIT TYPE AND MATERIAL ACRONYMS

UNIT TYPE ACRONYMS

Table 8-1 – Unit Type Acronyms

Acronym	Unit type
BB	Belisha Beacon
BL	Traffic Bollard
FL	TBC
OT	TBC
SC	School Flasher Unit
SL	Street Lighting
SU	Subway
TS	Traffic Sign
TU	TBC

MATERIAL ACRONYMS

Table 8-2 – Material Acronyms

Acronym	Material
ALUM	Aluminium
CAST	Cast Iron
CONC	Concrete
CONCRETE A	Concrete type A
CONCRETE B	Concrete type B
CONCRETE C	Concrete type C
HIN	Hinged
MST	Mild Steel
N/A	Not Applicable/ Assumed to be wall mounted
NULL	Not known
ORN	Ornate
SST	Stainless steel
STGLV	Galvanised Steel
WOOD	Wood

Appendix B

COST ANALYSIS

COST ANALYSIS

ASSUMPTIONS

The following list of assumptions was made during the fiscal analysis of different solutions:

1. The luminaire wattage and therefore energy usage has been uniformly applied at 30W. This is roughly what could be expected within a residential street or park environment. It should be noted that some suppliers offer a slight variation in this figure, but the values have been assumed negligible for the purpose of this exercise. No photometry data has been assessed to confirm manufacturers proposed solution is compliant and this shall require confirmation.

2. The annual 'burn' hours whereby the luminaire will be operational as also been universally applied as 4100 hours which roughly aligns to a 35lux switch regime.

3. The cost of a new column was provided by City of York at £1,100 and this includes and column & luminaire. It was assumed that under all options the existing column will be life expired and shall require replacement at the start of the 25-year period. For renewable options a cost of £300 for just a column has been applied which is additional to the capital cost of the manufacturer luminaire. The likelihood to the column being damaged, failing or requiring replacement does not change for the various options so therefore no allowance has been made for accidental damage or emergency call outs.

4. Northern Power Grid's website advises the current disconnection cost of an unmetered connection is £650. This value has been applied for all off-grid solutions.

5. Each manufacturer has advised periodic replacement of batteries will be required. This varies in cost as shown. Snapfast did not provide this information, so the cost as been assumed as per Kight's costs. The period between battery replacement is also manufacturer specific and varies between 5 – 8 years. Therefore, the battery replacement exercise has been assumed to be carried out every 6yrs at the same time the 6 yearly period inspection and test is carried out.
6. SolarVision advise a yearly inspection to confirm correct operation and that vegetation growth is not impacting system. Manufacturer offer this service at a cost dependant on number of columns with an example of 10 columns costing £125 per year per column. Cost not allowed for in breakdown as assumed CoY maintenance provider will carry out this inspection for all lighting assets.

7. An average assumed rate of inflation 1% has been applied year on year throughout the 25-year period.

ANALYSIS

Please see next page for analysis table.

Equipment Type	Supplier	N/A	Kight	Snapfast	Snapfast	Solar Vision	Solar Vision
	Technical Solution	N/A	Solar & Wind	Solar & Wind	Solar Only	Solar Only	Solar Only
	Retrofit / New column	DNO Supplied column & luminaire	New column only	Retrofitted Solution	New column only	Retrofitted Solution	New column only
	Wattage of Luminaire	30	30	30	30	30	30
	Estimated Annual Burn Hours	4100	4100	4100	4100	4100	4100
Installation	Luminaire / Solar PV Costs	£0.00	£3,217.50	£2,500.00	£1,600.00	£2,170.00	£2,738.00
	Labour & Commissioning	£0.00	£250.00	£250.00	£250.00	£250.00	£250.00
	New 6m Column (Fully Installed)	£1,100.00	£300.00	£300.00	£300.00	£300.00	£300.00
Cost of Disconnection	Standard NPG UMS Disconnection Fee	£0.00	£650.00	£650.00	£650.00	£650.00	£650.00
Cost of Battery Replacement	As advised by supplier		£300.00	£300.00	£300.00	£175.00	£175.00
Average Rate of Inflation for next 25 years (Assumed)		1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
1st Year Rate of Return	Cost of Energy (£/kWh)	0.31	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£38.13	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£38.13	£0.00	£0.00	£0.00	£0.00	£0.00
2nd Year Rate of Return	Cost of Energy (£/kWh)	0.31	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£38.51	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£76.64	£0.00	£0.00	£0.00	£0.00	£0.00
3rd Year Rate of Return	Cost of Energy (£/kWh)	0.32	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£38.90	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£115.54	£0.00	£0.00	£0.00	£0.00	£0.00
4th Year Rate of Return	Cost of Energy (£/kWh)	0.32	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£39.29	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£154.82	£0.00	£0.00	£0.00	£0.00	£0.00
5th Year Rate of Return	Cost of Energy (£/kWh)	0.32	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£39.68	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£194.50	£0.00	£0.00	£0.00	£0.00	£0.00
6th Year Rate of Return	Cost of Energy (£/kWh)	0.33	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£40.08	N/A	N/A	N/A	N/A	N/A

	Periodic Inspection	£100.00	£100.00	£100.00	£100.00	£100.00	£100.00
	Assumed battery replacement	N/A	£318.46	£318.46	£318.46	£185.77	£185.77
	Lifetime Energy Cost	£334.58	£418.46	£418.46	£418.46	£285.77	£285.77
7th Year Rate of Return	Cost of Energy (£/kWh)	0.33	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£40.48	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£375.05	£0.00	£0.00	£0.00	£0.00	£0.00
8th Year Rate of Return	Cost of Energy (£/kWh)	0.33	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£40.88	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£415.93	£0.00	£0.00	£0.00	£0.00	£0.00
9th Year Rate of Return	Cost of Energy (£/kWh)	0.34	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£41.29	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£457.22	£0.00	£0.00	£0.00	£0.00	£0.00
10th Year Rate of Return	Cost of Energy (£/kWh)	0.34	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£41.70	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£498.92	£0.00	£0.00	£0.00	£0.00	£0.00
11th Year Rate of Return	Cost of Energy (£/kWh)	0.34	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£42.12	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£541.04	£0.00	£0.00	£0.00	£0.00	£0.00
12th Year Rate of Return	Cost of Energy (£/kWh)	0.35	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£42.54	N/A	N/A	N/A	N/A	N/A
	Periodic Inspection	£115.00	£115.00	£115.00	£115.00	£115.00	£115.00
	Assumed battery replacement	N/A	£338.05	£338.05	£338.05	£197.19	£197.19
	Lifetime Energy Cost	£698.58	£871.50	£871.50	£871.50	£597.96	£597.96
13th Year Rate of Return	Cost of Energy (£/kWh)	0.35	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£42.97	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£741.55	£0.00	£0.00	£0.00	£0.00	£0.00
14th Year Rate of Return	Cost of Energy (£/kWh)	0.35	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£43.40	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£784.95	£0.00	£0.00	£0.00	£0.00	£0.00
15th Year Rate of Return	Cost of Energy (£/kWh)	0.36	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£43.83	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£828.77	£0.00	£0.00	£0.00	£0.00	£0.00
16th Year Rate of Return	Cost of Energy (£/kWh)	0.36	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£44.27	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£873.04	£0.00	£0.00	£0.00	£0.00	£0.00
17th Year Rate of Return	Cost of Energy (£/kWh)	0.36	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£44.71	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£917.75	£0.00	£0.00	£0.00	£0.00	£0.00

18th Year Rate of Return	Cost of Energy (£/kWh)	0.37	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£45.16	N/A	N/A	N/A	N/A	N/A
	Periodic Inspection	£130.00	£130.00	£130.00	£130.00	£130.00	£130.00
	Assumed battery replacement	N/A	£358.84	£358.84	£358.84	£209.33	£209.33
	Lifetime Energy Cost	£1,092.91	£1,360.35	£1,360.35	£1,360.35	£937.29	£937.29
19th Year Rate of Return	Cost of Energy (p/kWh)	0.37	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£45.61	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£1,138.52	£0.00	£0.00	£0.00	£0.00	£0.00
20th Year Rate of Return	Cost of Energy (£/kWh)	0.37	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£46.07	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£1,184.58	£0.00	£0.00	£0.00	£0.00	£0.00
21st Year Rate of Return	Cost of Energy (£/kWh)	0.38	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£46.53	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£1,231.11	£0.00	£0.00	£0.00	£0.00	£0.00
22nd Year Rate of Return	Cost of Energy (£/kWh)	0.38	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£46.99	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£1,278.10	£0.00	£0.00	£0.00	£0.00	£0.00
23rd Year Rate of Return	Cost of Energy (£/kWh)	0.39	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£47.46	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£1,325.56	£0.00	£0.00	£0.00	£0.00	£0.00
24th Year Rate of Return	Cost of Energy (£/kWh)	0.39	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£47.94	N/A	N/A	N/A	N/A	N/A
	Periodic Inspection	£145.00	£145.00	£145.00	£145.00	£145.00	£145.00
	Assumed battery replacement	N/A	£380.92	£380.92	£380.92	£222.20	£222.20
	Lifetime Energy Cost	£1,518.50	£1,886.27	£1,886.27	£1,886.27	£1,304.49	£1,304.49
25th Year Rate of Return	Cost of Energy (£/kWh)	0.39	N/A	N/A	N/A	N/A	N/A
	Annual Cost	£48.41	N/A	N/A	N/A	N/A	N/A
	Lifetime Energy Cost	£1,566.91	£0.00	£0.00	£0.00	£0.00	£0.00
Total Capital Cost		£1,100.00	£4,717.50	£4,000.00	£3,100.00	£3,545.00	£4,113.00
Total Operational Cost		£1,566.91	£1,886.27	£1,886.27	£1,886.27	£1,304.49	£1,304.49
Total Cost of Ownership (Estimated over 25yr period)		**£2,666.91**	**£6,603.77**	**£5,886.27**	**£4,986.27**	**£4,849.49**	**£5,417.49**
Operational Restrictions		All year-round operation: 12 Months	Manufacturer advises lighting estimated to only be operational from: March - September Estimated 7 Months per Annum (Manufacturer advises with 50% dimming regine between 00:00 - 05:00 the operational period would be 8 months (March – October)	Manufacturer advises that this can work as an off-grid solution. Estimated 7 Months per Annum	Manufacturer claims that solar solutions cannot work as off-grid solutions in UK. Unable to provide further detail at this point.	Manufacturer claims that solar solution would struggle over winter months for roads lit to P04 with a dimming regime to P05. Estimated 7 Months per Annum	Manufacturer claims that solar solution would struggle over winter months for roads lit to P04 with a dimming regime to P05. Estimated 7 Months per Annum

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