HEAT AND THE CITY

Heat Networks: Planning for a Zero-Carbon World

UK Local Authority District Energy Vanguards Network

Sheffield, 10 March 2020

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District Energy Vanguards Network

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https://heatandthecity.org.uk/

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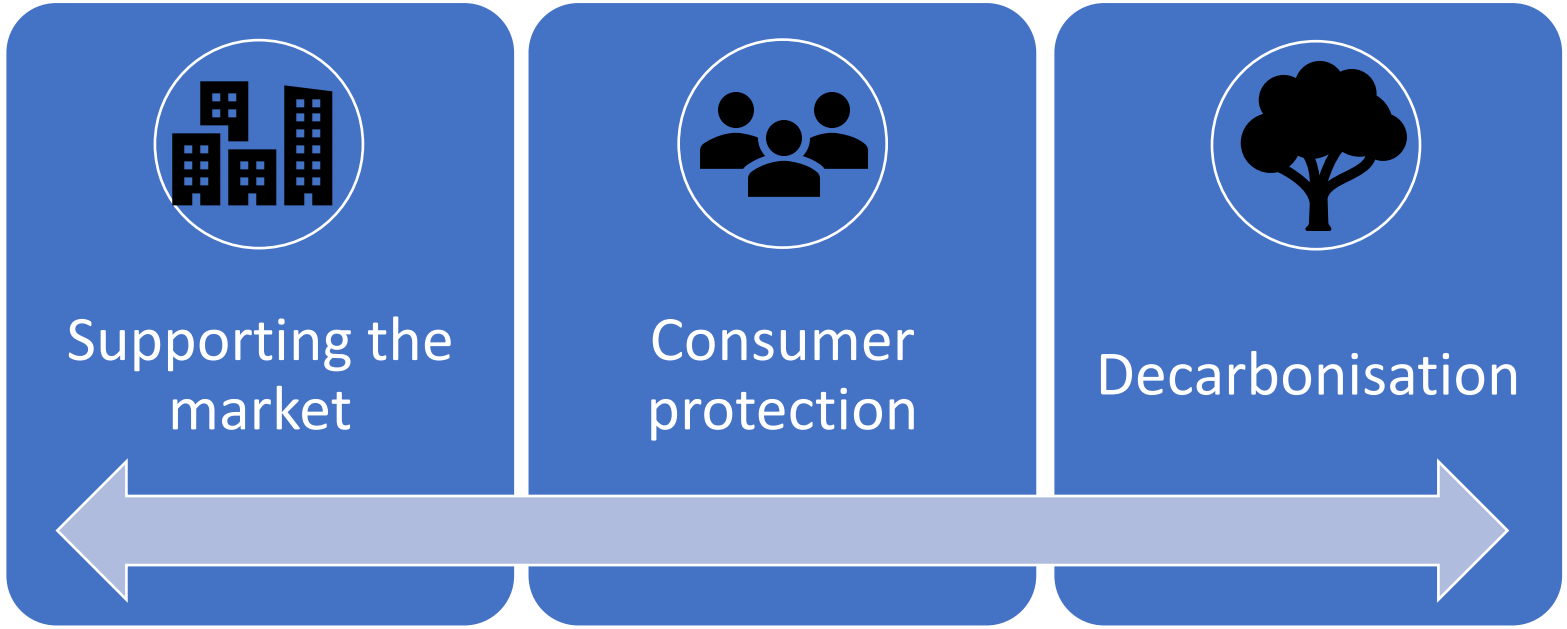
Heat Networks Market Framework

2020 consultation: summary of proposals & next steps

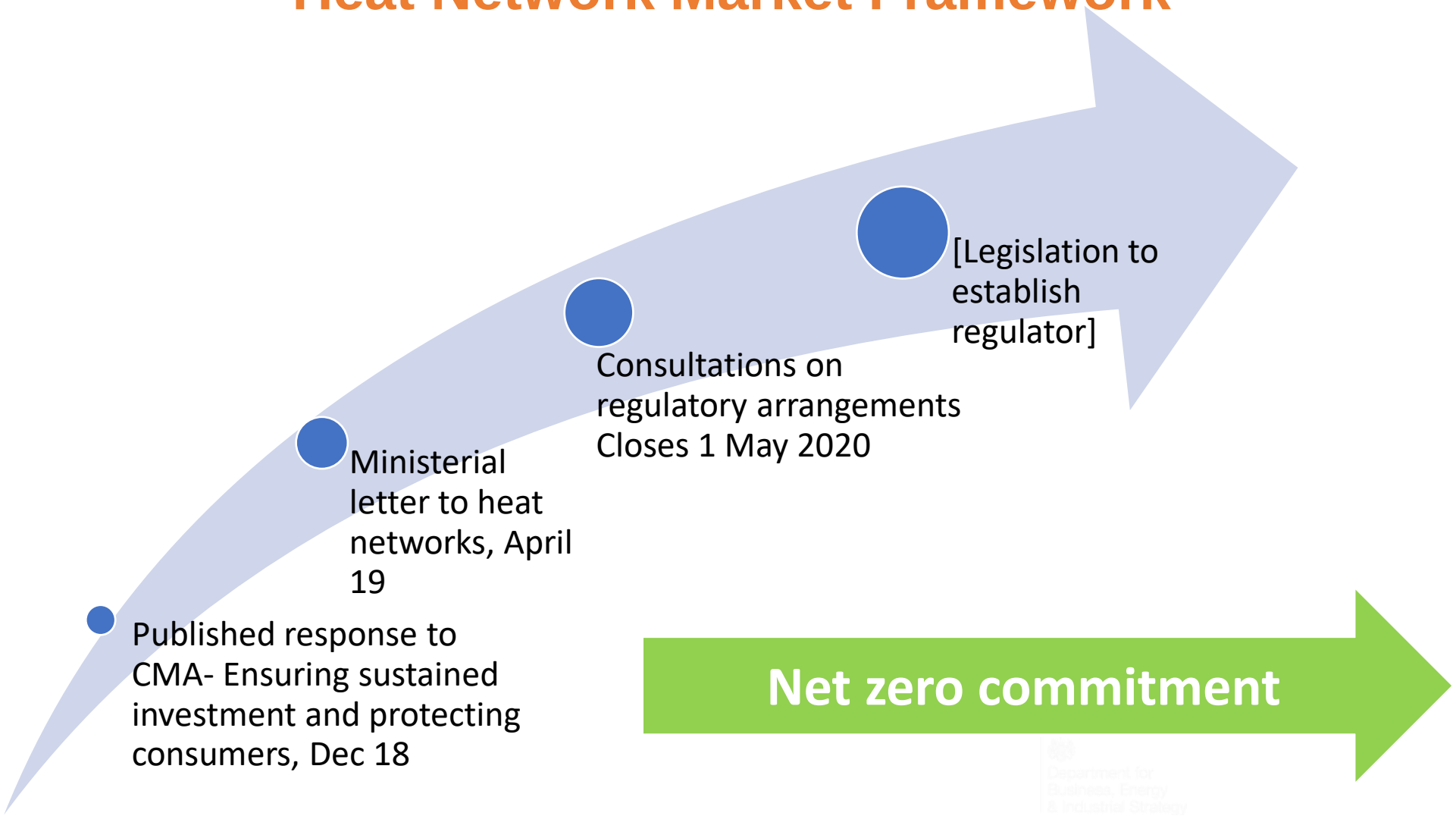
17 March, 2020

Department for Business, Energy & Industrial Strategy

Why are we consulting?



Heat Network Market Framework



Supporting market growth and investment

Building HNs' reputation and regulatory certainty

- Introducing a regulatory framework equivalent to other critical infrastructure markets
- Driving up performance of poorer performing networks and outcomes for consumers

Reducing development burden and risks

- Introducing statutory rights and powers equivalent to other utilities
- Developing standardised project documentation and guidance
- Keeping under review whether the costs of a more interventionist approach such as demand assurance or RAB become appropriate

Improving investor understanding of costs and returns

- Published whole life cost of energy tool (February 2020)
- Sharing anonymised project data and learning from HNIP (Heat Networks Investment Project)

Supporting heat networks as local solution

- Promoting local development of heat (network) zones where appropriate
- Working with MHCLG to ensure Building Regulations enable heat networks, rather than act as barrier

Rights and Powers

We propose that heat networks are granted the same statutory powers as other utilities, specifically:

- **Permitted development:** classifying certain aspects of heat network development as not requiring planning permission
- **Easements:** granting licenced entities the rights to apply to the Secretary of State for the right to purchase access rights over land
- **Street works:** ensuring that heat networks can carry out street works on the same permit system as other utilities and that have the legal rights to install and maintain heat network piping under streets
- **Consultation rights:** we will commit to improve guidance on when heat network projects should be consulted about developments that could affect them
- **Linear obstacle rights:** granting licenced entities equivalent rights to cross 'linear obstacles' such a railway lines, tramways or canals and to enter into arbitration if there is a legitimate case.

Consumer Protection

- CMA recommended giving heat network consumers **equivalent protections** to those in the gas and elec sector.
- Consumer protection measures to be included in the **general conditions** that suppliers and/or operators will need to meet under a general authorisation regime (GAR).
- Propose that consumer protection measures should apply to **domestic consumers and micro-businesses.**
- Reporting requirements could be **tailored to scheme size**, with scope for implementation periods for existing networks.
- Suppliers encouraged to work to improve their quality of service ahead of regulation, by joining Heat Trust (the industry led voluntary consumer protection scheme).

Transparency

- Requirement to develop information packs containing minimum pre-contractual information
- Requirements on the provision of heat supply agreements or equivalent
- Minimum standards on billing, billing frequency, and back-billing

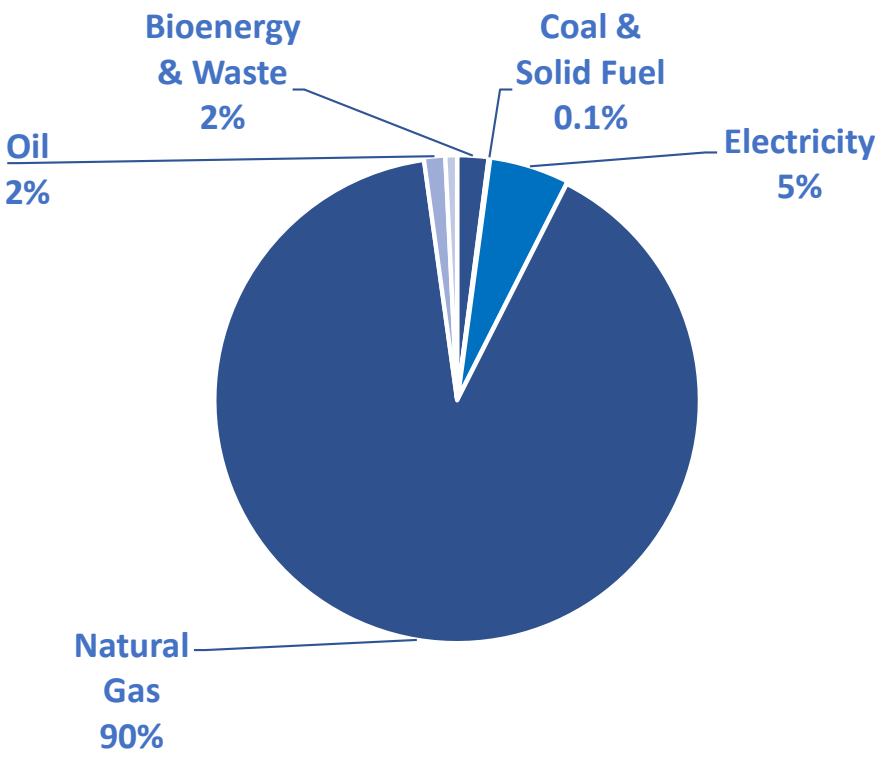
Pricing

- Mandatory price transparency
- Powers for Ofgem to investigate prices where they appear to be "disproportionately high"
- Price cap not needed at present, to be kept under review

Quality of service

- Statutory access to independent redress, e.g. Energy Ombudsman
- Ofgem to set outcome-based quality of service standards

Decarbonisation



Heat Network fuel sources (including all communal and district), Heat Network Experimental Statistics 2017

- To meet net-zero we know that the heat network sector will have to grow and decarbonise over the period to 2050.
- The Future Homes Standard, to be introduced in 2025, will ensure that new networks supplying new buildings will be run on lower carbon heating.
- Consulting on whether to introduce a carbon emissions limit on heat networks specified in legislation.
- Working with Defra on options to encourage companies producing waste-heat to connect to heat networks.

Indicative regulatory structure

BEIS
- Responsible for introducing primary legislation
- Appoints Regulator
- Grants Easements (to licensed parties)
- Sets decarbonisation standards in agreement with Devolved Administrations
- Provides guidance & support to LAs incl re concessions or zones

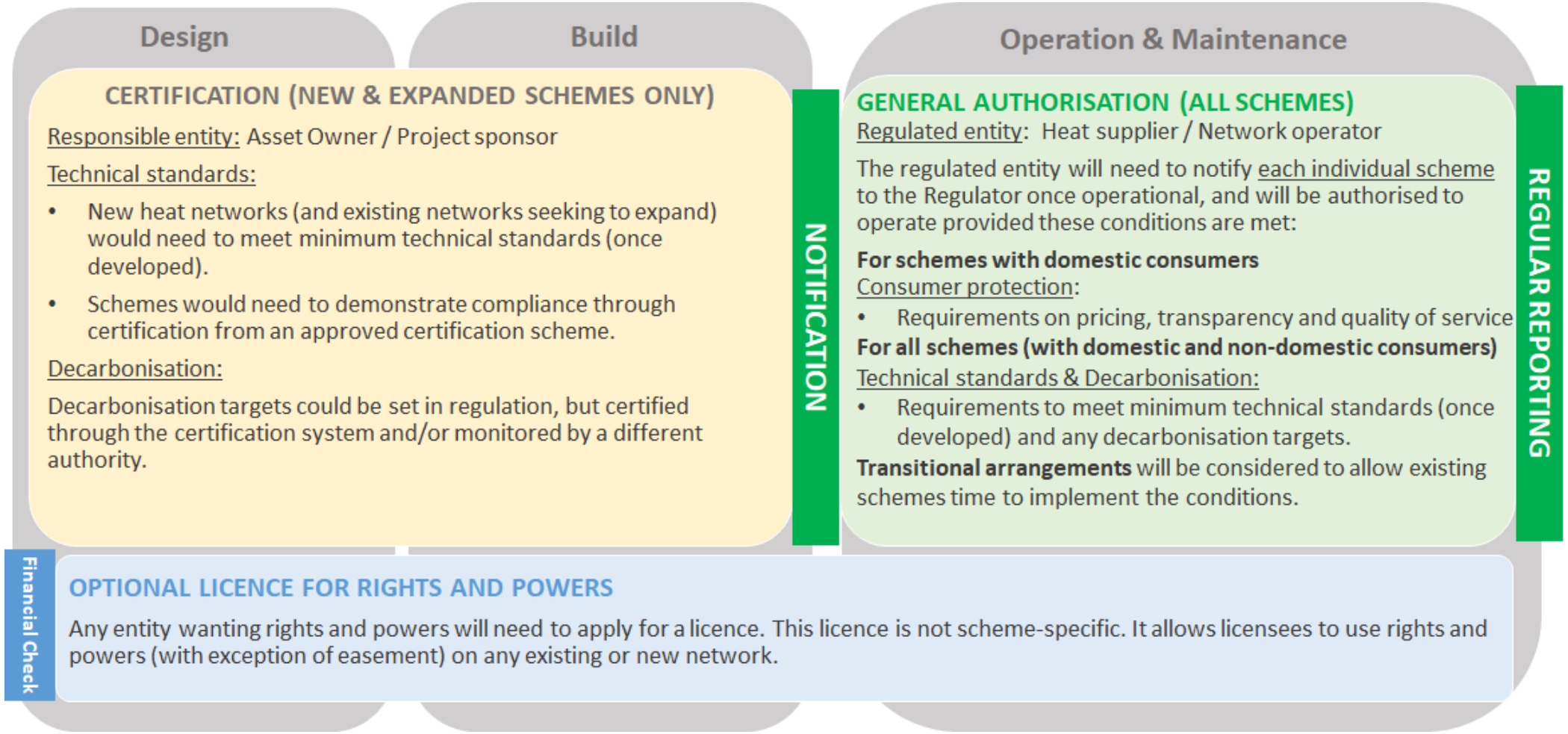
Office for Product Safety & Standards (OPSS)
- Currently monitors and enforces Heat Network Metering & Billing Regulations 2014

Local Authorities
- Develop local approaches to decarbonisation
- May use zoning or concession arrangements

Regulator [Ofgem]
- Authorises schemes and grants licences
- Sets quality of service standards
- Monitors pricing
- Ensures regulated entities demonstrate compliance with relevant technical standards
- Enforcement powers to compel compliance incl fines and right to remove licence /authorisation

Energy Ombudsman
- Handles individual complaints
- Regulated entities required to provide their consumers with access to Ombudsman service

Proposed Regulatory Model: General Authorisation with optional licence for rights and powers



Next steps…

Policy options for Heat Networks Market Framework

- Overarching scope of regulator's functions
- Consumer Protection provisions
- Market & investment support
- Decarbonisation & technical standards
- Rights and Powers provisions
- Consulting on scope of **primary powers** (within an Act)

Govt response and further, more detailed consultation

- Addressing areas from first consultation
- Confirming scope of primary powers and setting out:
- Further policy proposals on areas still under development
- Additional details to support **secondary legislation** (the actual regulations)

Detail of regulatory obligations

- Development of the specific regulations within scope of the primary powers confirmed earlier
- Detail of obligations placed on the regulated entity, potentially including those to be set out in a licence

First consultation on high level proposals
Published Feb 2020

Further policy development on detailed proposals
Later in 2020

Bill to secure primary powers
TBC

Secondary legislation
TBC

How to respond

- Consultation online:
- https://www.gov.uk/government/consultations/heat-networks-building-a-market-framework
- Respond using online survey (preferably please!) or to heatnetworks@beis.gov.uk
- Early feedback very welcome
- Deadline: 1 May 2020

HEAT AND THE CITY

David Malsom

Barnsley Council

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Barnsley Civic Quarter – Ambient loop network

Heat Network Project Development

2019 Outline Business Case

The T&F 2017 completed by Ramboll and validated by the Carbon identified a GAS CHP network

Reviewed in 2019 OBC study

Funded via BEIS and WYCA, with BEIS funded PM support (Brilliant resource)

Carbon Trust with SWECO as consultants, ARUP (PM support)

- Issue of continuity
- Project fatigue

A longer step toward Ambient loop heat network

- Review identified Carbon savings and financial model results from the CHP—poor
- What changed in meantime: Climate Emergency and Funding landscape
- Gas CHP wouldn’t qualify for qualify for HNIP funding and failed to meet the Council’s carbon reduction commitments.
- Why couldn’t we stretch to more renewable option.
- Initially mine water –however SWECO identified a useable aquifer at 100 m depth
- Following these results, ambient loop network option is being studied.

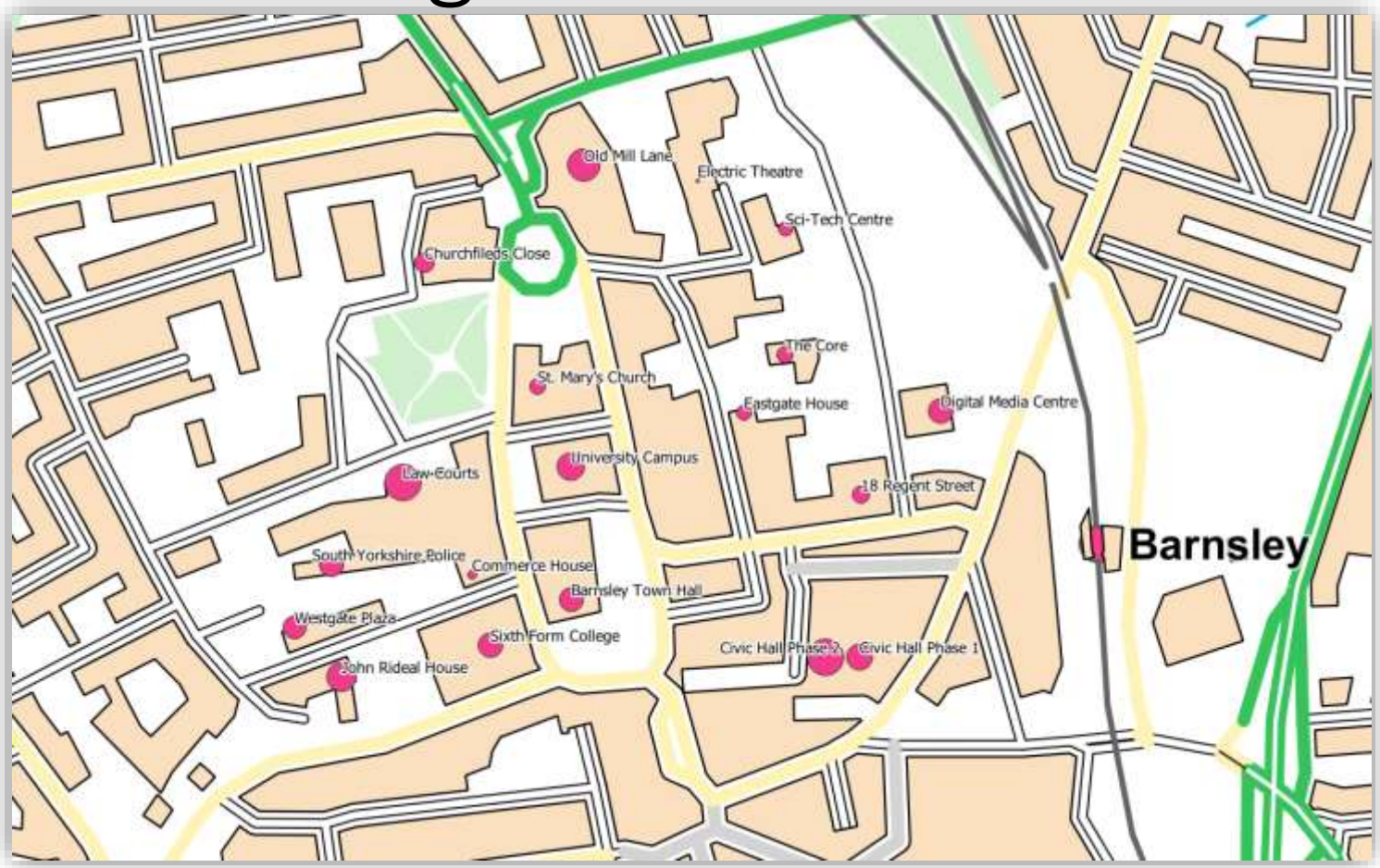
Ambient Heat Loop

- Open-loop borehole system
- Ambient flow and return temperatures (10+°C), dramatically reduced heat losses
- Utilisation of existing plant room space. No energy centre build costs
- Renewable sourced electricity driven water source heat pumps (with COPs of 2.4 to 2.6) at each building connection assisted with thermal stores
- Low Carbon Heat Network okay, zero carbon heat pretty good, zero carbon heat and power fab.
- Three scenarios to be modelled:
    - All buildings included
    - Council core
    - Geographical core

Ambient loop heat network

- Abstraction of 90 l/s is required to meet the heat demand of the buildings. Six to twelve boreholes are able to provide this abstraction rate. The exact number of boreholes can be defined after borehole pilot testing where abstraction rates can be measured. The capital cost of design and drilling is accounted for 12 boreholes.
- Each building will link to the distribution network with a separate pumped circuit and its own WSHP system.
- On the user side, flow and return temperatures are designed for 80°C and 65°C, respectively. A better understanding of the heating regime of each individual building, coupled with refitting can bring these temperatures down, improving the efficiency of the system and reducing the operating cost for the individual building.

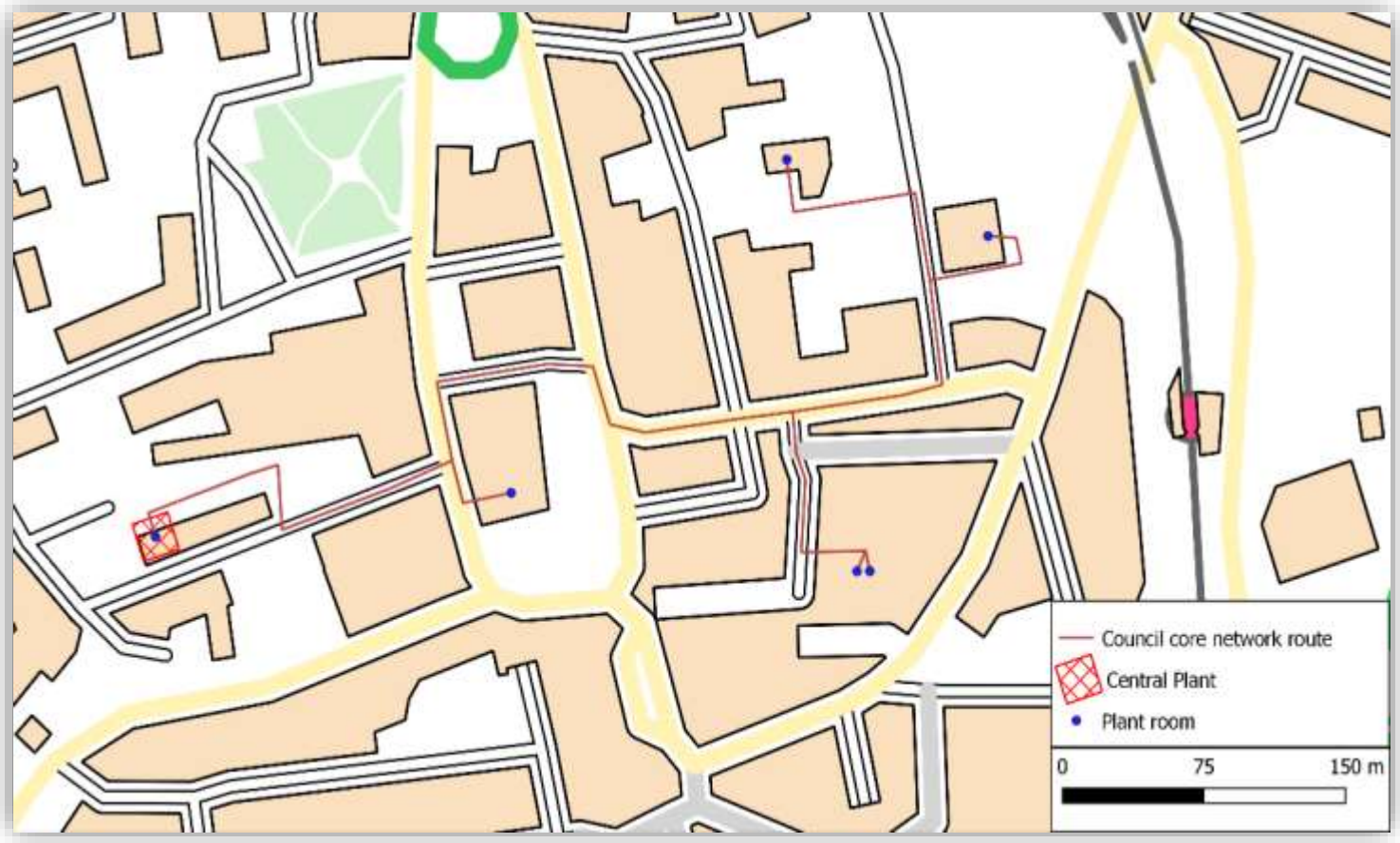
Ambient Loop Heat Network Concept Design – All Buildings



Heat network details

	Value
Annual heat demand	8.6 GWh/year
Peak heat demand	6.6 MW
Network Route Length	2.3km
Linear Heat Density	4.3 GWh/year/km

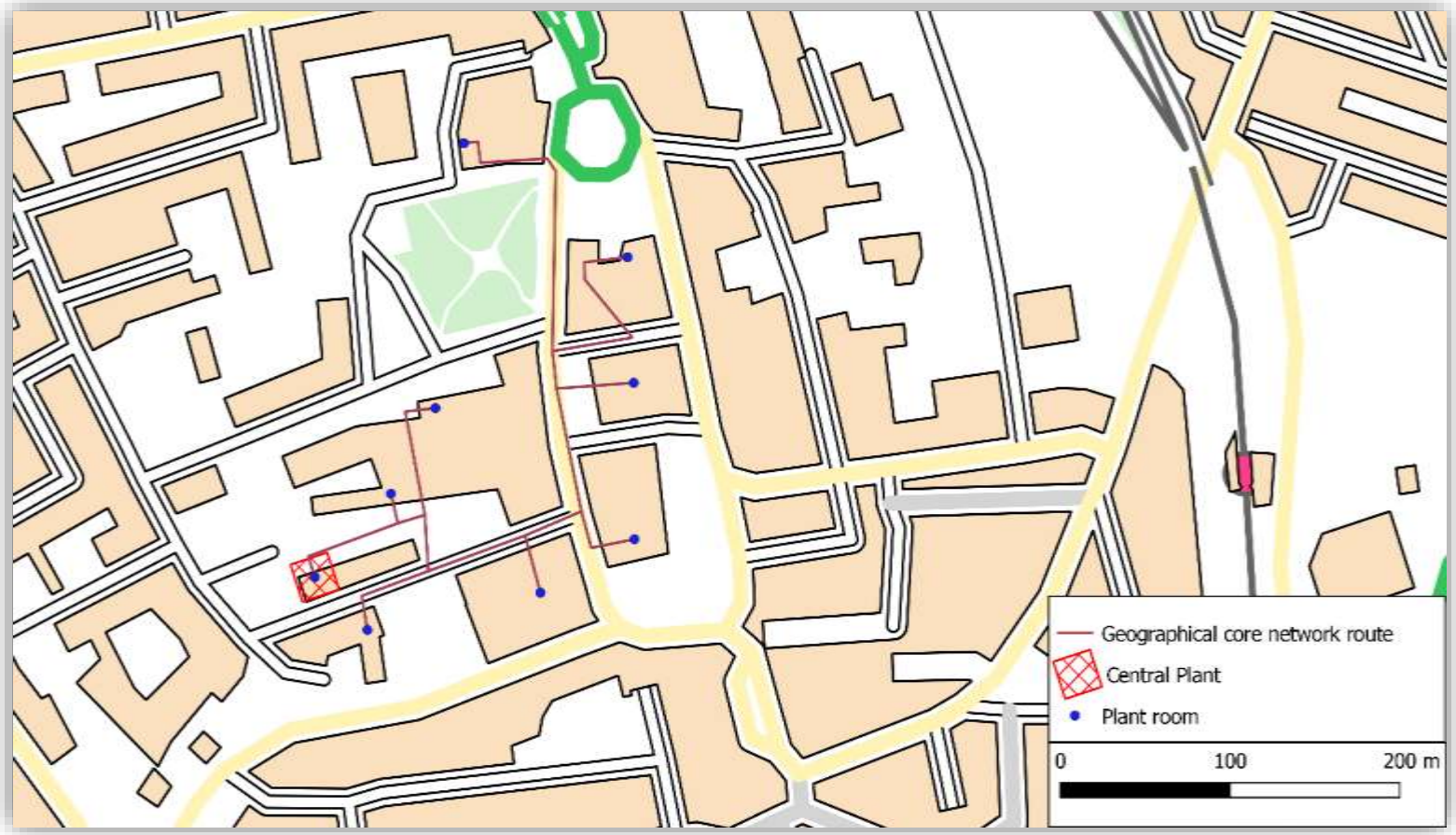
Ambient Loop Heat Network Concept Design – Council Core



Heat network details

	Value
Annual Heat Demand	3.4GWh/year
Peak Heat Demand	2.6MW
Network Route Length	1.2km
Linear Heat Density	3.4GWh/year/km

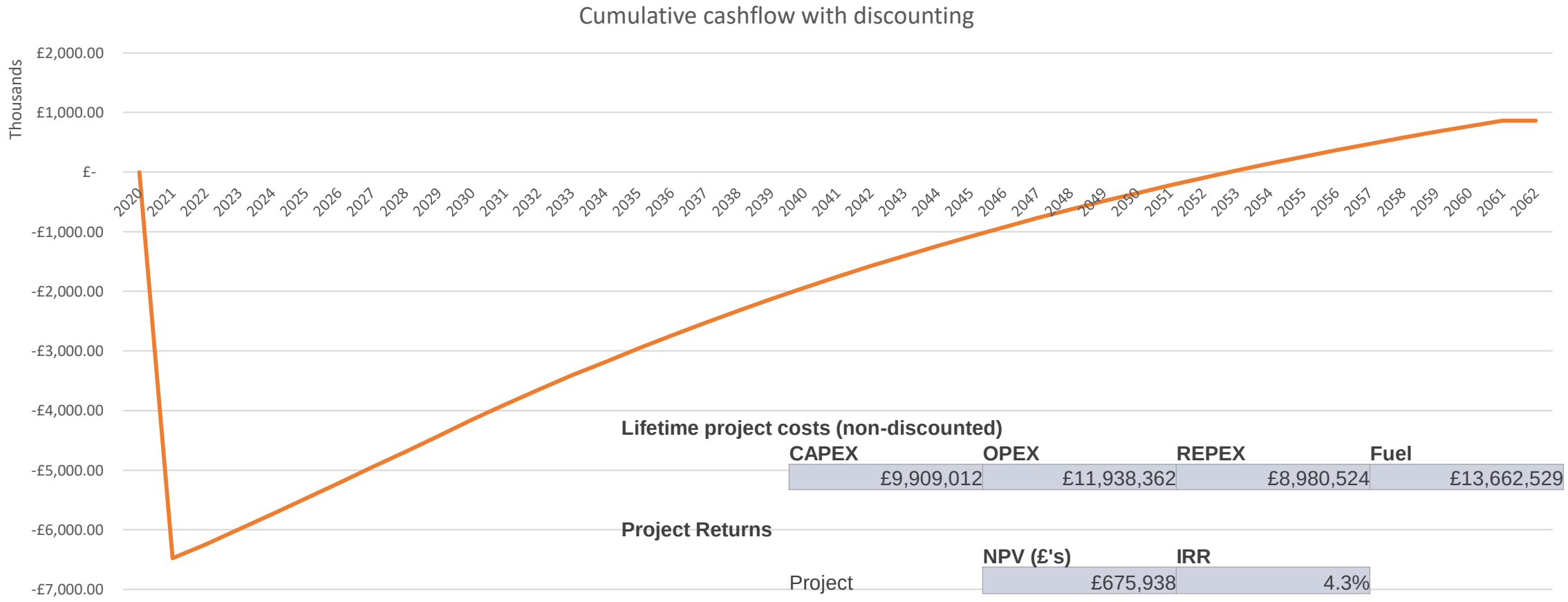
Ambient Loop Heat Network Concept Design – Geographical Core



Heat network details

	Value
Annual Heat Demand	4.6GWh/year
Peak Heat Demand	3.4MW
Network Route Length	0.6km
Linear Heat Density	5.1GWh/year/km

Final Financial results – All Buildings



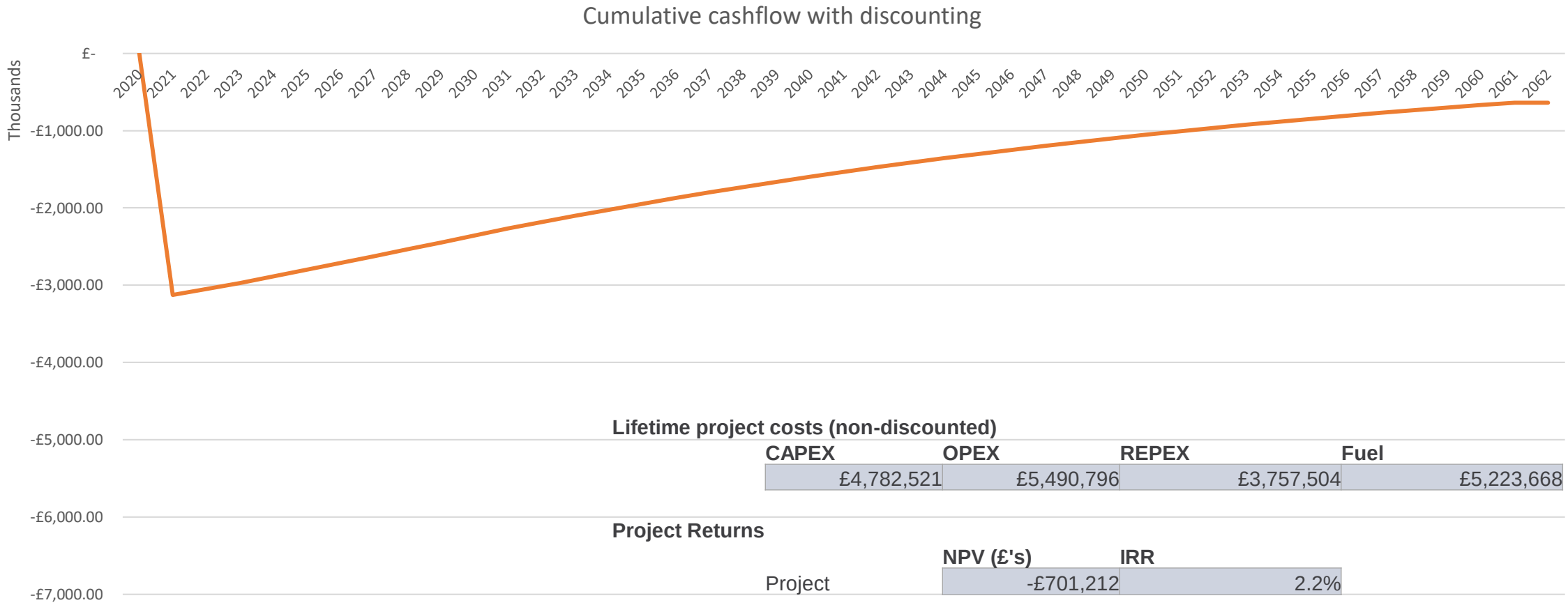
Lifetime project costs (non-discounted)

CAPEX	OPEX	REPEX	Fuel
£9,909,012	£11,938,362	£8,980,524	£13,662,529

Project Returns

	NPV (£'s)	IRR
Project	£675,938	4.3%

Final Financial results – Council Core



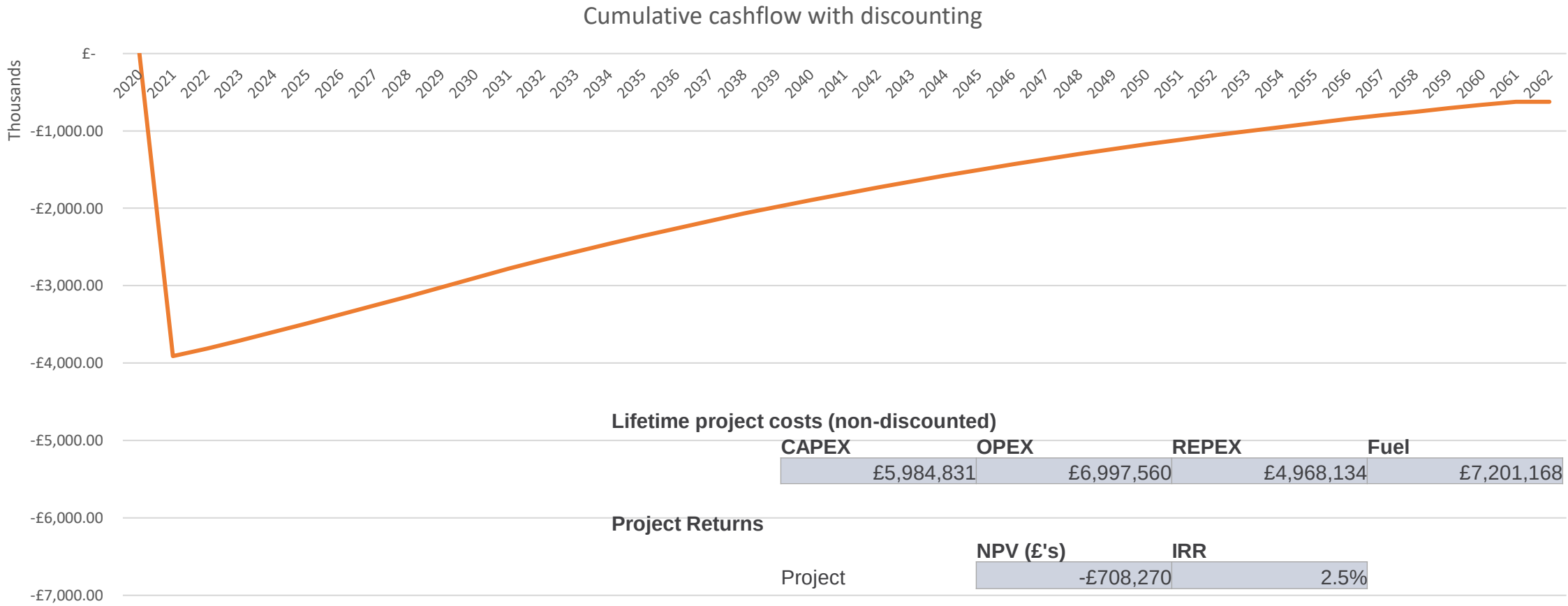
Lifetime project costs (non-discounted)

CAPEX	OPEX	REPEX	Fuel
£4,782,521	£5,490,796	£3,757,504	£5,223,668

Project Returns

	NPV (£'s)	IRR
Project	-£701,212	2.2%

Final Financial results – Geographic Core



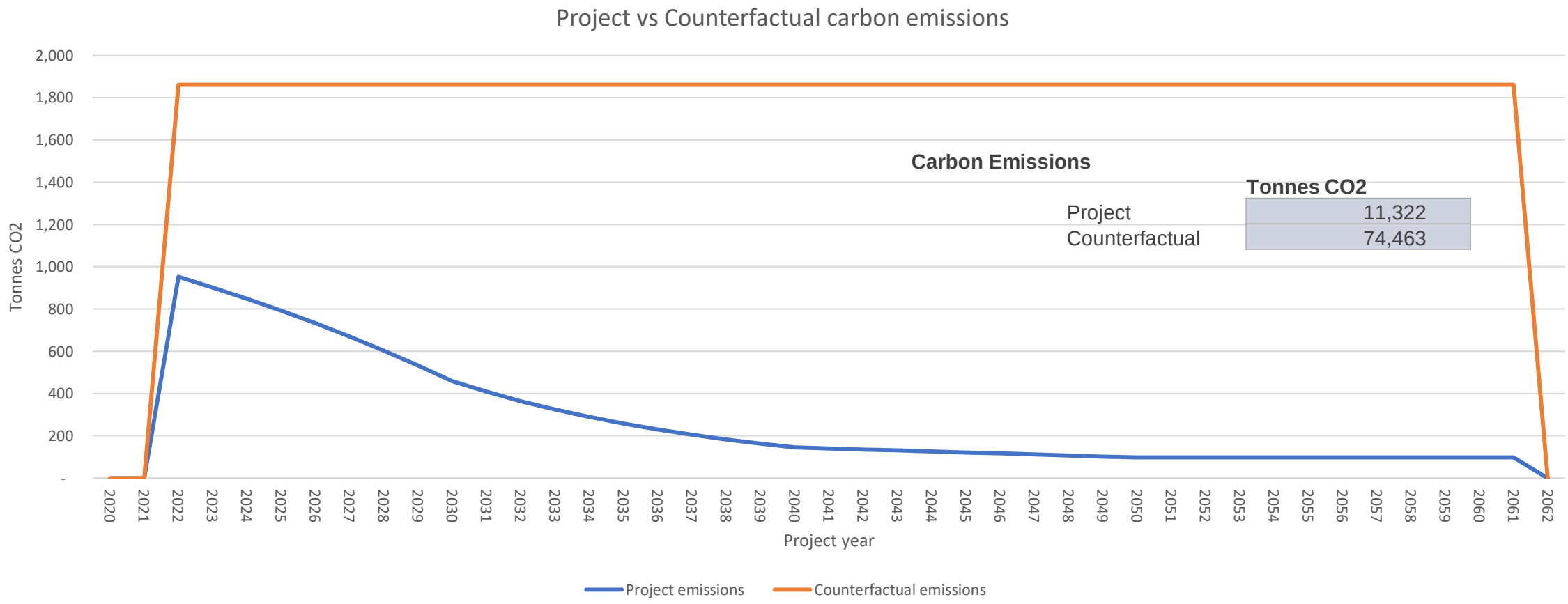
Lifetime project costs (non-discounted)

CAPEX	OPEX	REPEX	Fuel
£5,984,831	£6,997,560	£4,968,134	£7,201,168

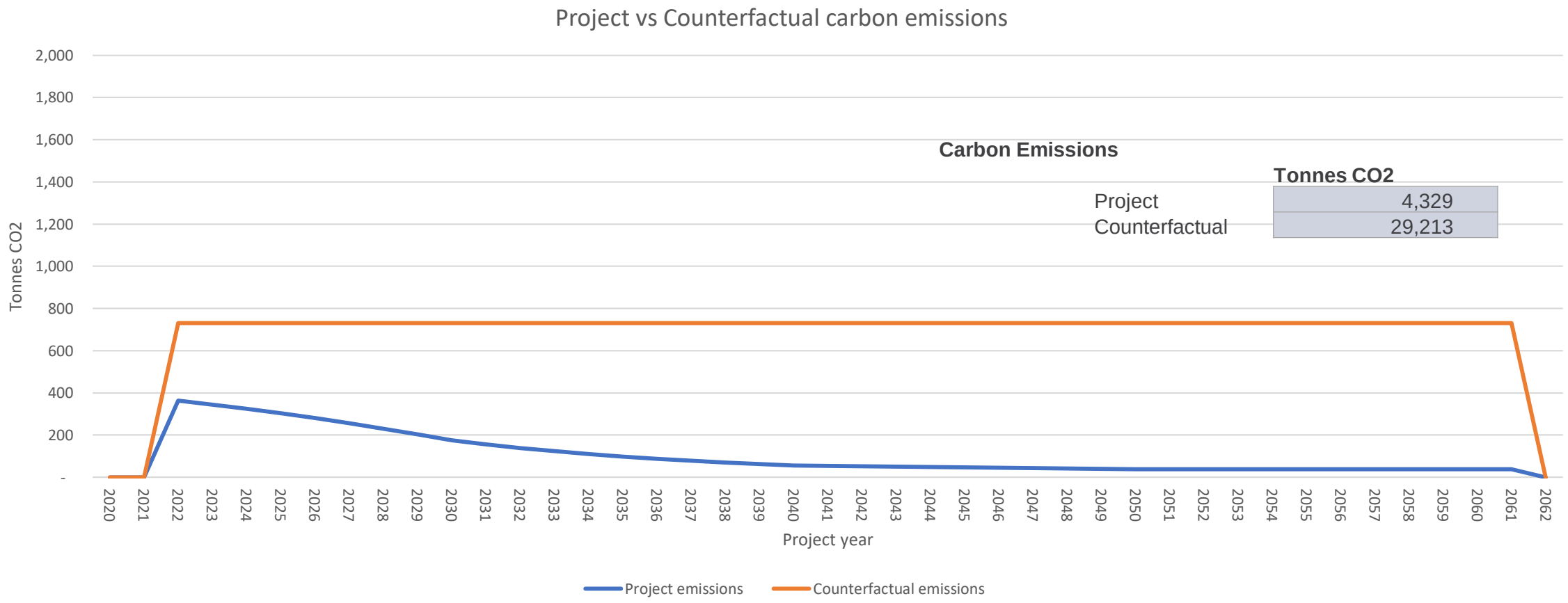
Project Returns

	NPV (£'s)	IRR
Project	-£708,270	2.5%

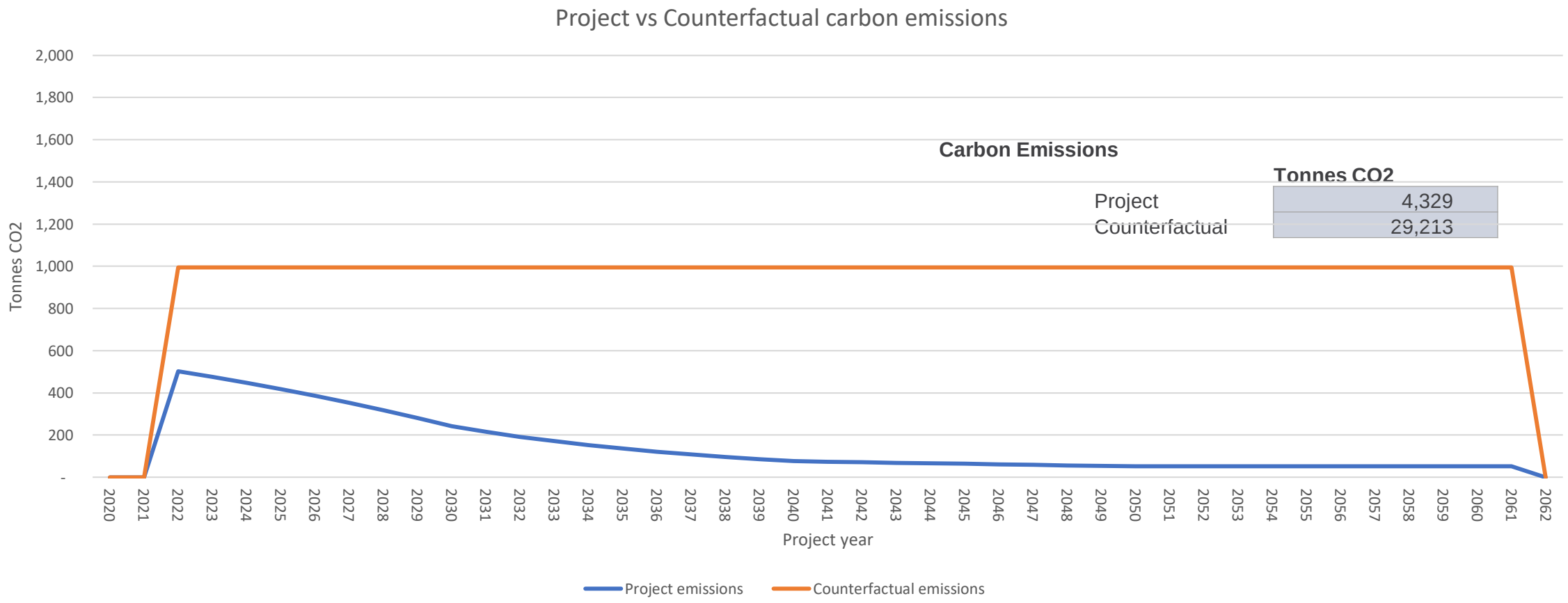
Final carbon savings – All Buildings



Final carbon savings – Council Core



Final carbon savings – Geographic Core

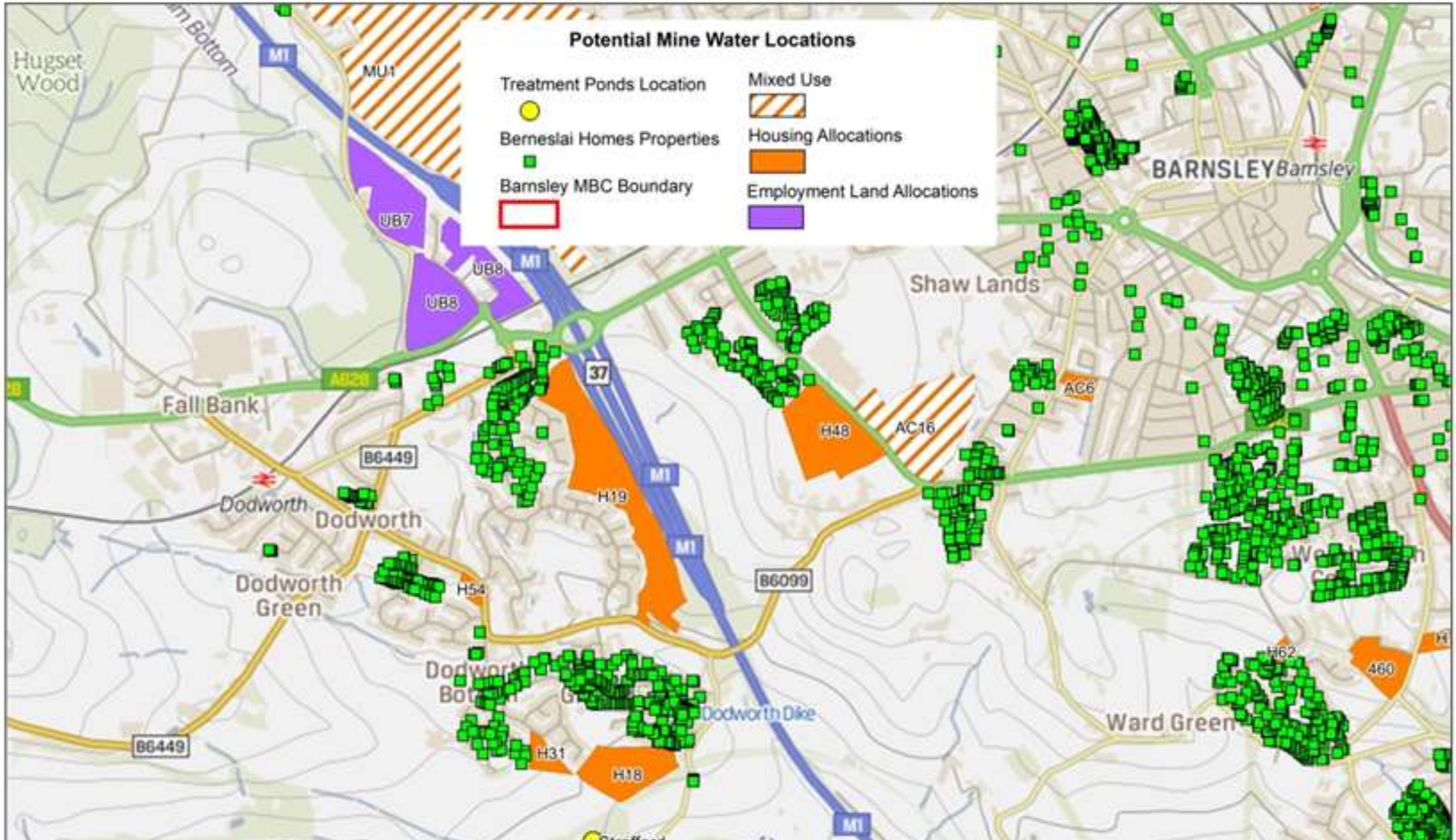


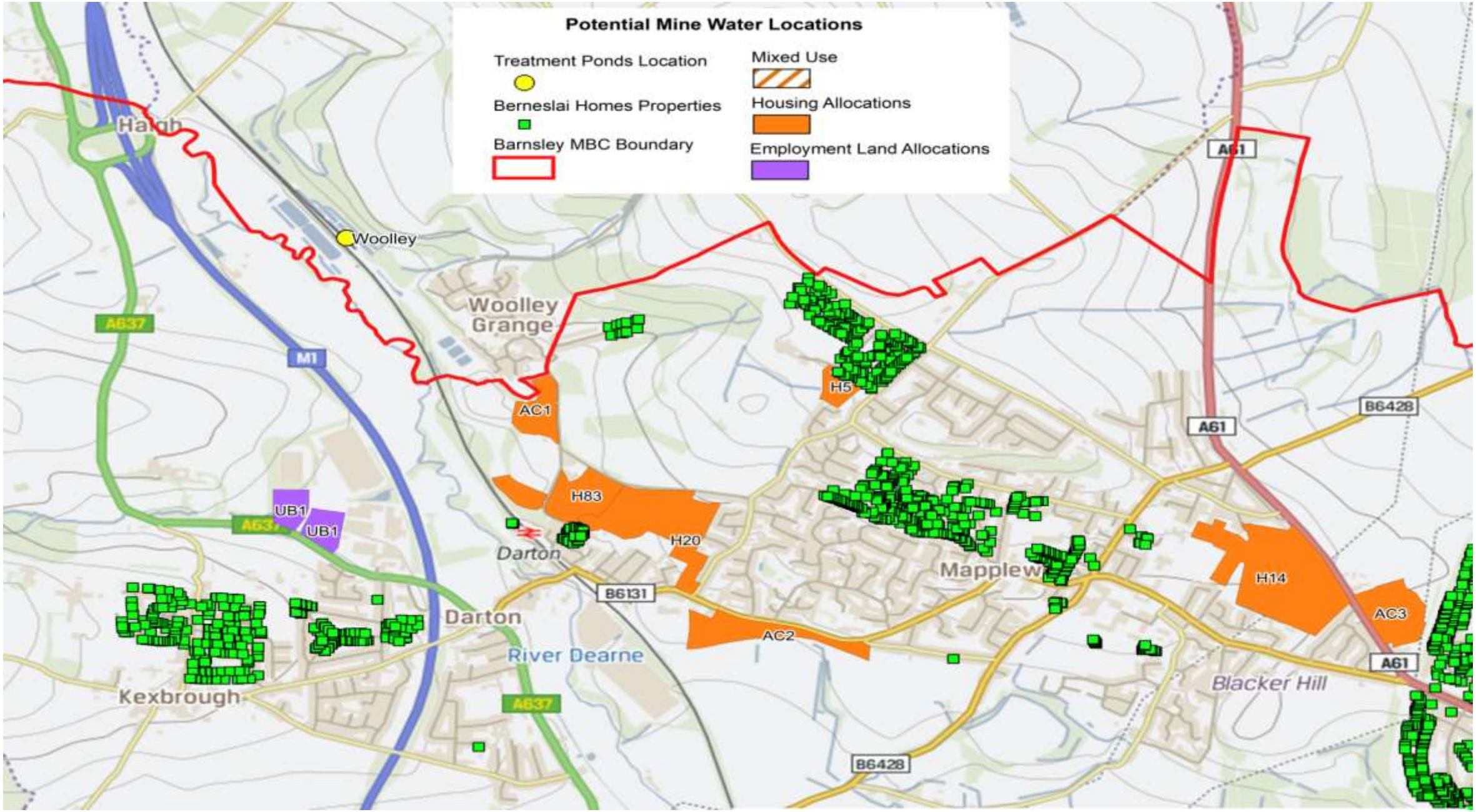
Next Steps

- Refined modelling following feedback
- Overall, the ambient loop option is technically and financially viable & Sweco recommends that the Council move forward with the project
- CoP 2.5-BEIS not happy as not much better than traditional ASHP
- Why a heat network –can we reduce cap ex by local sites connecting to 2-3 buildings only

Minewater

- BEIS Funded Study
- Treatment lagoons
- Low cost option if fed into existing buildings


Potential Mine Water Locations
Treatment Ponds Location
Berneslai Homes Properties
Barnsley MBC Boundary
Mixed Use
Housing Allocations
Employment Land Allocations
Hugset Wood
MU1
UB7
UB8
M1
37
AB28
Fall Bank
B6449
Dodworth
Dodworth
Dodworth Green
H54
H19
H48
AC16
AC6
Shaw Lands
BARNSLEY Barnsley
B6099
Dodworth Dike
H31
H18
H62
460
Ward Green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Hatch
Woolley
Woolley Grange
A637
M1
AC1
H5
A61
B6428
UB1
UB1
H83
H20
Darton
B6131
Mapplewell
H14
AC3
AC2
Darton
River Dearne
Kexbrough
Blacker Hill
A637
B6428

Detail

- The pumping figures for Woolley and Strafford are circa 130 and 35 litres/second.
- This means that Woolley has a heat source of circa 2720kW and Strafford of 732kW.
- The number of homes this could heat is 1650 and 300 respectively according to CIBSE guidance for heat networks based on a central heat pump.
- The temperature of the mine water is less of a consideration although it does improve heat pump efficiency, for Woolley we have figure of 15*C, which is midrange of mine water in the UK.
- Heat pumps can also be mounted in each dwelling and raw mine water circulated at lower temperatures.

Opportunities

- Elsecar Heritage Centre-co location and availability
- Penistone High School-underfloor heating
- Opportunities within local plan

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UK District Energy Vanguards Network

Iain Greenshields

10 March 2020

Newcastle City Council
Regenerate Partnership

Regenerate Partnership
Outline

- Ambitious project reflecting the Council's ambitions in terms of being a carbon neutral city
- 40 year partnership with private sector partner to develop district energy projects across the city
- Supported by LEP/ERDF funding
- Procured under a competitive dialogue process
- Sample scheme – Newcastle Helix
- Bidders required to propose partnering terms and a bespoke solution for the Newcastle Helix project
- Engie Urban Energy appointed as Council partner in August 2018

Regenerate Partnership
Partnering strategy

- Council had some history of district heating already
- Wanted to create a partnering vehicle that could (in due course) incorporate existing projects, as well as create new projects
- Broad scope for OJEU
- All projects to be brought forward by the Council – sample project and list of potential projects included in the OJEU – all other potential public sector partners named
- Contract structure does not address delivery of private sector projects

Regenerate Partnership
Partnering strategy

- Council and Engie Urban Energy are parties to the Partnering Agreement, and to the SPVs through which the projects are delivered
- SPVs are not parties to the Partnering Agreement in their own right
- Risk sharing provisions around development of new projects within two stage approval process
- Equity return of SPV not compromised by project development costs if projects are public sector sponsored
- No obligation for SPV to bid for private sector schemes – can bid at own risk or informally through partnering arrangement

Other strategies re partnering

- Concept of “exclusivity”
- Overarching partnering arrangement incorporated within concession agreement – so SPV bidding (and future schemes tied into delivery vehicle)
- Risk sharing around public sector schemes only, plus obligation on SPV to bid for private sector schemes in administrative area
- No risk share at all and no exclusivity – invite SPV to invest in project development without any potential reimbursement for development costs
- Impact on overall project return?

Project delivery vehicle

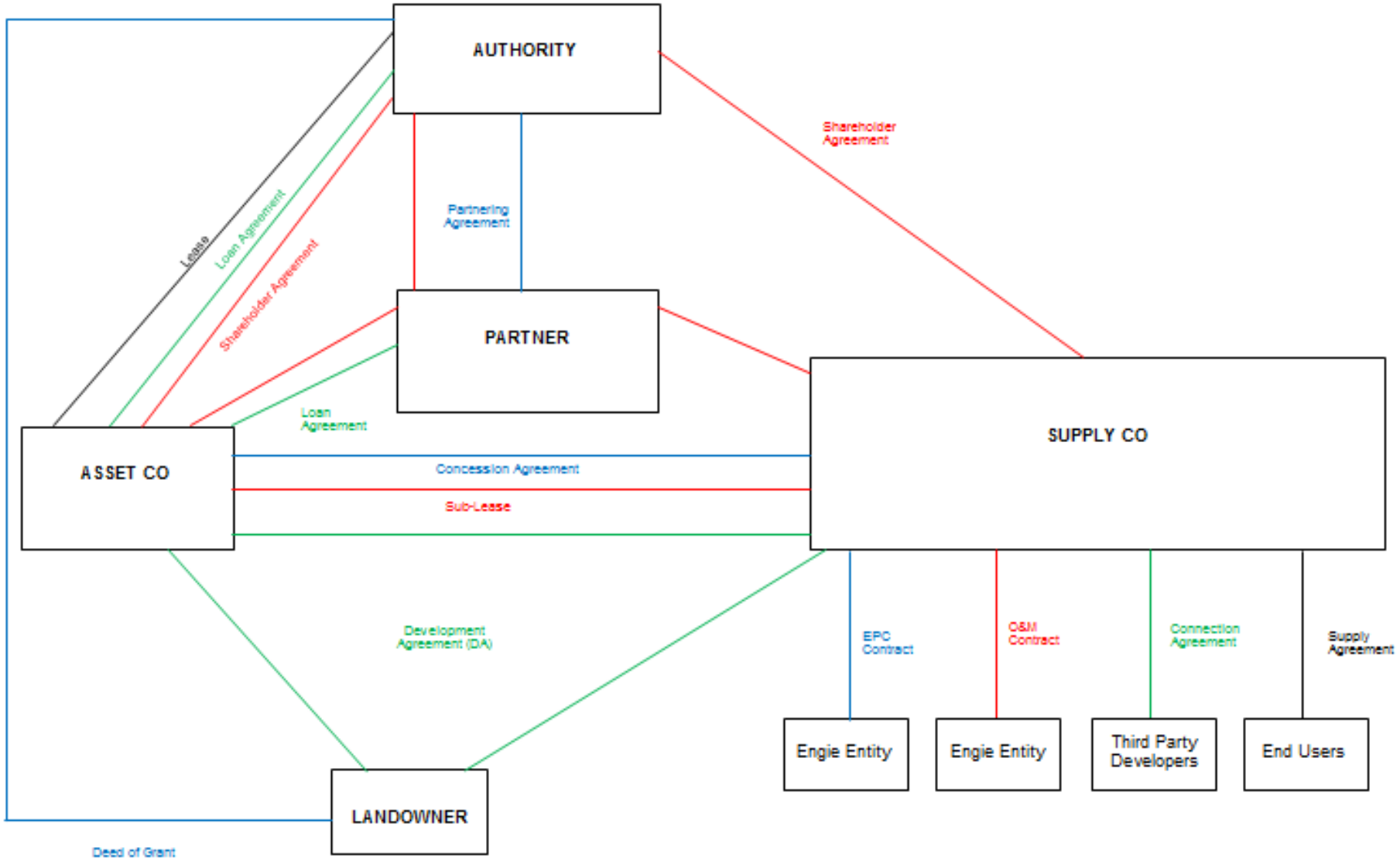
Council settled on a corporate structure using two SPVs

- Asset Co
  - Majority owned by local authority
  - Owns the scheme assets
  - Low level of return, but little risk
- Supply Co
  - Majority owned by private sector partner
  - Concession agreement with Asset Co to use assets to provide service – provides energy works and services
  - Better level of return, more risk

Newcastle Regenerate Partnership
Contract structure

- Partnering Agreement – Council/Engie
- Shareholders' Agreement for operating company (Supply Co) – Council minority shareholder
- Shareholders' Agreement for asset holding company (Asset Co) – Council majority shareholder
- Concession Agreement – Asset Co/Supply Co
- Connection/Supply Agreements – Supply Co/third party end users
- Development Agreement/Leases – property ownership and management of development risk

NEWCASTLE CITY COUNCIL - Regenerate Contract Structure



Lessons learned

- Settling terms under a CD process, then applying those terms to third party transactions – need for twin-tracking documentation –standardisation will help
- Fixing construction cost during CD – robust preferred bidder letter required
- Delivery of district energy project in the context of a new property development – new scheme vs retrofit
- Aligning interests of public sector partners
- Affordability/grant funding/state aid considerations
- Robust documentation developed for all elements, not just procurement documents (standardisation will help)

18 months on …

- Still engaging with developers of sample scheme, and signing Connection/Supply Agreements as sites are delivered
- Energy Centre completed and operational
- New projects coming forward
  - Greater focus on finding renewable energy sources – including River Tyne
  - Number of projects in development – not just those considered at project scoping
  - Understanding of project structure from developers/other public sector players?
- Resources committed from both Council and Engie

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