

Nottinghamshire Police and Crime Commissioner**Notice of Decision**

Author:	Tim Wendels
Telephone number:	0115 9672370
E-mail address:	Tim.wendels@nottinghamshire.pnn.police.uk
For Decision or Information	Information
Date received*:	06.03.14
Ref*:	2014.010

*to be inserted by Office of PCC

TITLE: REPLACEMENT OF OIL FIRED HEATING AT SHERWOOD LODGE WITH BIOMASS**EXECUTIVE SUMMARY:**

It is proposed to replace the existing oil fired heating system at Sherwood Lodge with a biomass boiler to serve the main building, former recreation block and OHU buildings.

The proposals including costs and benefits, can be summarised as follows:-

Capital Investment: estimated at around £283K covering:

Heat hub packaged plant room with integrated fuel store and fill pipes (for wood pellets).

Concrete base, 320 kW biomass boiler and buffer tank.

NPV of revenue **savings** over 20 years: £0.9M

Payback period: 6/7years

Average annual return on investment: 18%

Annual reduction in CO2 emissions: 183.0 Tonnes

There is already provision in the capital programme to cover this expenditure.

INFORMATION IN SUPPORT OF DECISION: (e.g report or business case)

Please see attached Business Case.

Is any of the supporting information classified as non public or confidential information**?	Yes		No	X
If yes, please state under which category number from the guidance**:				

DECISION:

To note the proposals to install a biomass boiler at Sherwood Lodge contained within the Business Case.

DECLARATION:

I confirm that I do not have any disclosable pecuniary interests in this decision and I take the decision in compliance with the Code of Conduct for the Nottinghamshire Office of the Police and Crime Commissioner. Any interests are indicated below:

The above request has my approval.

Nottinghamshire Police and Crime Commissioner
Notice of Decision

Signature: 
Nottinghamshire Police and Crime Commissioner

Date: 14/3/14

OFFICER APPROVAL

I have been consulted about the proposal and confirm that the appropriate advice has been taken into account in the preparation of this report. I am satisfied that this is an appropriate request to be submitted to the Police and Crime Commissioner.

Signature: 
Chief Executive

Date: 14th March 2014

** See guidance on non public information and confidential information.

For Decision	
Public/Non Public*	Public
Report to:	Force Executive Board
Date of Meeting:	17th February, 2014
Report of:	Tim Wendels, Head of Estates and Facilities
Report Author:	Ainsley Peters
E-mail:	ainsley.peters10755@nottinghamshire.pnn.police.uk
Other Contacts:	Darren Fox
Agenda Item:	7

*If Non Public, please state under which category number from the guidance in the space provided.

Replacement of Oil – Fired Heating at Sherwood Lodge with Biomass

1. Purpose of the Report

- 1.1 The attached business case considers options for the replacement of the current oil-fired heating system at Sherwood Lodge with biomass or ground source heat pump (GSHP). The report seeks approval to the proposal to install a biomass boiler as set out in the business case.

2. Recommendations

- 2.1 To install a 320kW biomass boiler as the primary heating provision for Sherwood Lodge with retention of two gas oil boilers as a contingency.

3. Reasons for Recommendations

- 3.1 The biomass boiler proposal (option 2 in the business case) has the following benefits:

Lower capital Investment: (estimated at around £270K) covering:

Heat hub packaged plant room with integrated fuel store and fill pipes (for wood pellets). Concrete base, 320 kW biomass boiler and buffer tank.

NPV of revenue savings over 20 years: £0.9M

Payback period: 6/7years

Average annual return on investment: 18%

Annual reduction in CO2 emissions: 183.0 Tonnes

Easier to install than a GSHP system

- Lower inherent investment risk due to the size of the capital investment proposed.
- The capital investment required can be funded out of the existing capital budget already approved by PCC for energy initiatives.
- Simpler commissioning and installation process meaning less disruption on site, less risk for budget and scope “creep”, and the ability to accelerate the Renewable Heat

Incentive (RHI) application process to “lock in” the best available RHI tariff before any potential digression.

- Significantly quicker payback period when compared to GSHP (6 years for biomass boiler and 15 years for GSHP).
- Better average annual return when compared to GSHP.
- Far better reduction in carbon emissions than GSHP.
- Able to fully decommission two existing oil-fired boilers and retain two for emergency contingency and maintenance (GSHP would require 1 oil-fired boiler to remain in use to support output in peak heating demand periods and provide a small percentage of the domestic hot water demand).

4. Summary of Key Points

- 4.1 The financial position is clear from the NPV calculations and is clearly illustrated by the cost analysis in the business case. Option 2 is viable, from a financial point of view, as long as there is no significant digression in the current RHI tariff. Significant slippage in delivering the project could result in the RHI dropping; this should be considered as a risk for the project.

- 4.2 Risks of GSHP systems:

Higher inherent investment risk due to the size of the capital investment proposed. Also, increased level of opportunity cost linked to lump investment in one carbon saving scheme.

Exceptionally long payback periods and very low return on investment.

Case study evidence of larger retrofits failing after completion.

Capital investment proposal exceeds existing capital budget and additional funds may not be approved by PCC.

Complex commissioning and installation process meaning considerable disruption on site.

Vast scope for unforeseen costs to escalate due to complexity of project.

Length of implementation period means undue delays in commencing the RHI application process - could mean potential digression in rates.

Considerably less reduction in carbon emissions than biomass.

Requirement to retain 1 oil-fired boiler to support output in peak heating demand periods and provide a small percentage of the domestic hot water demand. This is due to significantly lower flow temperatures being supplied from a GSHP system. Additionally, the GSHP runs on electricity meaning running costs will still be more susceptible to fuel price volatility than other sustainable fuel sources (e.g. wood pellets to run biomass).

5. Financial Implications and Budget Provision

- 5.1 See NPV calculations in attached business case.

- 5.2 Option 1 Do nothing – NPV shows circa £65k non-renewable heating cost with no revenue stream and no carbon reduction.
- 5.3 Option 2 Installation of a Biomass Boiler – NPV shows revenue savings over 20 years: £0.9M
Payback period: 6/7years
Average annual return on investment: 18%
- 5.4 Annual reduction in CO2 emissions: 183.0 Tonnes
- 5.3 Option 3 Installation of GSHP system – NPV shows revenue savings over 20 years: £0.5M
Payback period: 14 years
Average annual return on investment: 3%
Annual reduction in CO2 emissions: 100.0 Tonnes

6. Human Resources Implications

- 6.1 None.

7. Equality Implications

- 7.1 None.

8. Risk Management

- 8.1 See paragraph 4.1.

9. Policy Implications and links to the Police and Crime Plan Priorities

- 9.1 This business case proposal supports the Force's objective 2, namely, "*Spend your money wisely*", demonstrating a good rate of return to the Force against the capital investment proposed.

This project also promotes the PCC and Force Corporate Social Responsibility agenda by creating a more sustainable fuel supply and reducing its impact on the environment.

10. Changes in Legislation or other Legal Considerations

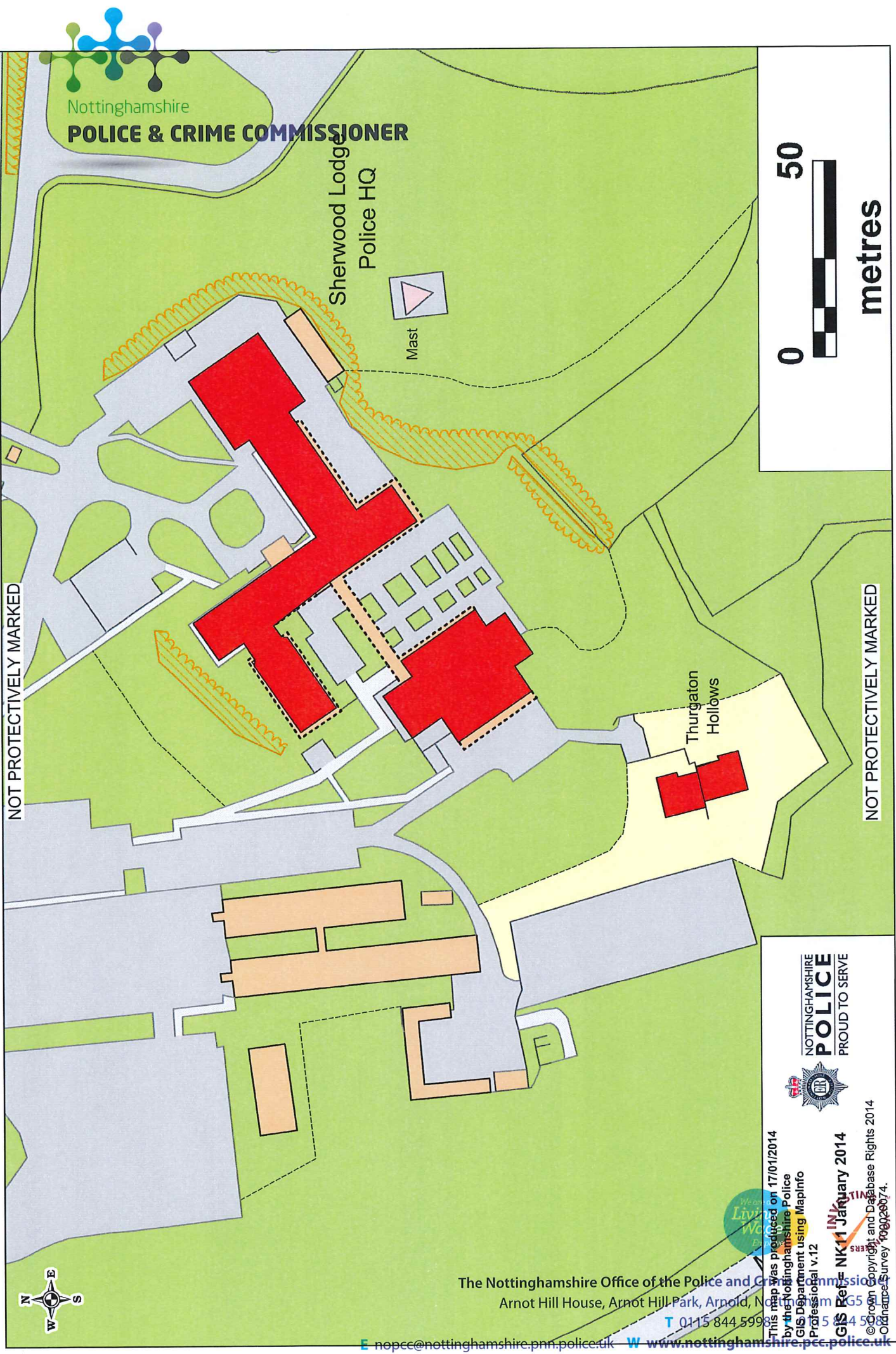
- 10.1 None.

11. Details of outcome of consultation

- 11.1 The proposal in this report has been supported by the Corporate Services Programme Board.

12. Appendices

12.1 Business Case attached.



Business Case



Project:	Replacement of Oil-Fired Heating at Sherwood Lodge
Date:	14/01/2014
Author:	Ainsley Peters

1. Executive Summary

This document outlines the business case to support the proposal to replace the existing oil-fired heating provision at Sherwood Lodge, encompassing the main building, recreational block, and OHU building (see site map Appendix 1). The original business case which was submitted in October last year provided an option to defer the overall decision with a caveat to reassess should RHI levels change significantly. The Department of Energy and Climate Change have decided to increase the RHI tariff for Ground Source Heat Pump systems which has warranted this business case.

The remit of areas the new heating provision will supply has changed slightly in line with changes to the estates rationalisation plan for HQ. The new heating provision will now serve the Main building, Recreational building & OHU (occupational health unit). This change in demand has impacted the financials which are explored within the business case.

Sherwood Lodge has undergone a range of fabric improvements in recent years to improve working conditions as well as reduce the energy consumption of the buildings. The site currently uses a Hoval oil fired system that is in need of replacement in order to reduce running costs and carbon emissions, in line with the Force's efficiency savings and carbon management plans respectively.

An assessment of viability was commissioned earlier in 2013 by the Estates department with Carbonzero – specialist consultants in water and renewable energy, to assess the potential for installation of either a ground source heat pump (GSHP) or a biomass system as a suitable replacement for the existing heating provision. A CYMAP software modelling exercise was also carried out to quantify the heating requirements of the buildings under consideration in order to specify the peak output requirements of the replacement technology.

Biomass boilers efficiently (and therefore cost effectively) extract energy from the burning of biomass fuels (wood pellets, chips or logs) to provide heating and hot water. Installation of a biomass system at Sherwood Lodge would require few changes to the main building emitter system and no change of emitter pipework for delivery of heat, although some upgrades will need to take place with regards to pumping, monitoring and control.

Whilst an open loop GSHP system is a technically feasible solution (as the site stands on an excellent sandstone aquifer) the emitter systems within the main building, recreation block and huts structure would require major re-design and re-fitting to interface effectively with the heat pump. The potential cost of this re-fit, and more importantly the degree of disturbance, are likely to be considerable and not easily quantifiable without invasive surveying.



POLICE & CRIME COMMISSIONER

As a result of this initial assessment and further internal reviews, including carbon reduction calculations and investment appraisal contained herein, the recommendation is to install a biomass system to replace the existing oil-fired boilers.

The proposal to replace the oil-fired heating system at Sherwood Lodge is one of a number of initiatives listed in the Force's carbon management plan that contribute to lowering our overall carbon emissions and a total capital budget of £870K has already been approved by the PCC for energy initiatives to be undertaken in the current Financial Year.

1.1 Issue

The existing oil-fired boilers at Sherwood Lodge are oversized, inefficient and costly to run as well as being carbon emission intensive. The proposed replacement biomass system will reduce running costs and cut carbon emissions.

The installation of a heating system that uses renewable energy will also result in the generation of the Central Government endorsed Renewable Heat Incentive (RHI) which will enable internally generated revenue for the Force (subject to the application process).

1.2 Benefits and impact of this work

The cashable benefits include:

- Reduced heating and hot water costs
- Generation of RHI revenue

The non-cashable benefits include:

- Increased energy efficiency
- Reduced carbon emissions
- Future proofing of heating provision

1.3 Summary costs

Option 1 – Do Nothing

Capital investment: - £nil.

Revenue cost implications: - running costs for the existing oil-fired boilers are currently around £65K per annum to heat the Sherwood Lodge main building and recreational block. These costs will continue to rise in line with the inflation of energy prices in future years.

Option 2 – Install a Biomass Boiler

Capital investment: - Biomass boiler installation and associated costs estimated to be around £283K. A detailed breakdown of these costs can be found in Section 5.

Revenue cost implications: - The cost of further consultancy work with Carbonzero is



PROTECTED

	<p>anticipated up to £10K to conduct further piping and heat loss surveys and also assist in the RHI application process.</p> <p><u>Option 3 – Install a Ground Source Heat Pump</u></p> <p>Capital investment: - GSHP installation, changes to heating pipe infrastructure and associated costs estimated to be around £904K. A detailed breakdown of these costs can be found in Section 5.</p> <p>Due to the additional conversion work involved in installing a GSHP system compared to a biomass system it should be noted that both the capital and revenue costs indicated here for Option 3 could infinitely increase dependant on the result of further detailed surveys needed to facilitate a full and final quote for the entire project cost.</p>
--	---

<p>2. Project Overview and the situation the project will address</p> <p>The existing oil-fired boiler system was installed in 1999 and is oversized, inefficient and costly to run as well as being carbon emission intensive. With a life expectancy of 20 years it has a remaining life of approximately 6-7 years.</p> <p>The proposal to replace the system before the end of its useful life arises for a number of reasons, not least the succession of traditional heating methods with new renewable energy source technology, facilitating:</p> <ul style="list-style-type: none">• Fuel efficiency• Carbon emission reduction• Ongoing running cost savings• RHI revenue generation <p>The 2 options considered for viability to replace the existing system were a ground source heat pump (GSHP) or a biomass system.</p> <p>GSHP systems use pipes buried underground to circulate a water and antifreeze solution and extract heat from the earth, whilst biomass systems (also called wood-fuelled heating systems) simply burn wood pellets, chips or logs.</p> <p>Both systems can be used to power central heating radiators, under floor or warm air heating and hot water systems. Running costs are inherently lower than the existing oil-fired system due to the renewable nature of the fuel source, which also presents a low (or nil in the case of the GSHP) supply chain risk.</p> <p>Installation of a biomass system at Sherwood Lodge would require few changes to the main building emitter system and no change of emitter pipework for delivery of heat, although some upgrades will need to take place with regards to pumping, monitoring and control. It requires a much smaller capital investment than the GSHP, will involve a far simpler commissioning and installation process and carries far less inherent risk for unforeseen project costs to occur.</p>
--



Whilst an open loop GSHP system is a technically feasible solution (as the site stands on an excellent sandstone aquifer) the emitter systems within the main building and the recreation block would require major re-design and re-fitting to interface effectively with the heat pump system. The potential cost of this re-fit, and more importantly the degree of disturbance, are likely to be considerable. There is also a far greater risk that unforeseen project costs could occur and impact on day to day operations within the specified building areas could be significantly affected. Consequently this is not the preferred option.

There is further rationale to consider the installation of a new renewable energy source heating provision as soon as possible in order to maximise the amount of RHI revenue available to the organisation. The RHI non-domestic incentive scheme has an inbuilt degression mechanism designed to ensure that the national RHI spend does not exceed its fixed annual budgets. Therefore, once uptake pushes up the total RHI payable on a national level, some or all tariffs will be lowered (known as degression).

RHI tariffs are reviewed and set quarterly by the Department of Energy and Climate Change (DECC) and are published by Ofgem (the regulatory body for the gas and electricity markets in Great Britain). Unfortunately there is no inevitability in uptake trends and therefore it is very difficult to predict how tariffs will be affected each quarter, but it should be expected that the rates will go down as well as up (rates can be increased to encourage uptake of certain technologies although there is no precedent of this since the scheme was introduced in November 2011).

Degression in RHI rates would significantly affect the viability of a new installation by reducing the organisation's ability to generate revenue from this project. If a timely decision is made to progress the proposal to install a biomass system at Sherwood Lodge, the necessary work can be commissioned and the application process can commence, in order to "lock in" the most favourable rate on offer at this current time. Once the locked in rate is confirmed this is guaranteed for 20 years and rises in line with RPI.

Degression of some rates has already occurred in 2013 and although there is no further forecast degression in 2014/15 this is entirely dependant on national uptake of the scheme so should not be ruled out.

It should be noted that at the time of writing this business case that there has been no change to biomass non-domestic RHI rates and GSHP RHI non-domestic rates have increased approximately two fold. The impact on revenue has been identified and highlighted in section 5.

3. Detail how the approach you are taking is innovative

The proposal to replace the existing oil-fired heating provision is innovative because it involves the use of a sustainable energy source to reduce revenue costs and carbon emissions for the Force, helping to achieve the required efficiency savings in this and future CSR periods whilst also having a positive impact on the environment.

This innovative project also upholds the Force's PROUD ethos as a way of approaching the current situation differently or: *"Doing things differently"*.



4. How does this support Force Objectives/Strategic Objectives?
<p>This business case proposal supports the Force's objective 2, namely, "<i>Spend your money wisely</i>", demonstrating a good rate of return to the Force against the capital investment proposed.</p> <p>This project also promotes the PCC and Force Corporate Social Responsibility agenda by creating a more sustainable fuel supply and reducing its impact on the environment.</p>

5. Options with costs and risks
<p><u>Option 1 – Do Nothing</u></p> <p>Capital investment: £nil NPV of revenue costs over 20 years: £1.6M Payback period: not applicable Average annual return on investment: not applicable Annual reduction in CO2 emissions: nil</p> <p>Risks: Increased running costs of oil-fired boilers in line with escalating fuel prices Loss of potential RHI revenue through rate depression</p> <p><u>Option 2 – Install a Biomass Boiler (to server Main, Recreational & OHU buildings)</u></p> <p>Capital Investment: estimated at around £283K covering:</p> <p>Heat hub packaged plant room with integrated fuel store and fill pipes (for wood pellets). Concrete base, 320 kW biomass boiler and buffer tank.</p> <p>NPV of revenue savings over 20 years: £0.9M Payback period: 6/7years Average annual return on investment: 18% Annual reduction in CO2 emissions: 183.0 Tonnes</p> <p>Risks: Please refer to Section 8.</p> <p><u>Option 3 – Install a Ground Source Heat Pump</u></p> <p>Capital investment estimated at around £904K covering:</p> <p>Open loop 320 kW installation including drilling and construction of boreholes. Borehole geophysics, test pumping and test pump analysis including re-injection testing and</p>



Nottinghamshire
Appendix 2

POLICE & CRIME COMMISSIONER

water quality analysis.

Consultancy for application process to Environment Agency for licence and permit.

Supply and install wellheads, permanent submersible pump, abstraction borehole riser and injection borehole pipework.

Plant room costs, heat pumps, cylinders and controls, insulated pipework from new heat pump to heat distribution pipe work.

£470K

Additional work to 254 separate areas requiring change in emitter system and 1 or more larger radiators installing.

Supply and install new emitters, removal of old emitters.

Move pipework connections to radiators and redecoration around completed works.

Pipework, fittings and TRVs around emitters.

Zoning controls.

£254K

Thermal stores and buffer vessels.

£30K

Interconnecting pipework from plant room and insulation.

£50K

Interconnecting pipework from buffers to zones.

£100K

NPV of revenue savings over 20 years: £0.5M

Payback period: 15 years

Average annual return on investment: 3%

Annual reduction in CO2 emissions: 100.0 Tonnes

Risks:

Higher inherent investment risk due to the size of the capital investment proposed. Also, increased level of opportunity cost linked to lump investment in one carbon saving scheme scheme.

Capital investment proposal exceeds existing capital budget and additional funds may not be approved by PCC.

Complex commissioning and installation process meaning considerable disruption on site.

Vast scope for unforeseen costs to escalate due to complexity of project.

Length of implementation period means undue delays in commencing the RHI application process - could mean potential degression in rates.

Considerably longer payback period when compared to Biomass.

Considerably lower average annual return when compared to Biomass.

Considerably less reduction in carbon emissions than Biomass.

Requirement to retain 1 oil-fired boiler to support output in peak heating demand periods and provide a small percentage of the domestic hot water demand. Additionally, the GSHP runs on electricity meaning running costs will still be more susceptible to fuel price volatility than other sustainable fuel sources (e.g. wood pellets to run biomass).



PROTECTED

Business Case Final Aug 2013

The Nottinghamshire Office of the Police & Crime Commissioner

Arnot Hill House, Arnot Hill Park, Arnold, Nottingham NG5 6LU

T 0115 844 5998 F 0115 844 5081

E nopcc@nottinghamshire.pnn.police.uk W www.nottinghamshire.pcc.police.uk

6. Preferred option

Option 2 - installation of a biomass boiler system is recommended for the following reasons (as previously outlined in Sections 1-5):

- Lower inherent investment risk due to the size of the capital investment proposed.
- The capital investment required can be funded out of the existing capital budget already approved by PCC for energy initiatives.
- Simpler commissioning and installation process meaning less disruption on site, less risk for budget and scope “creep”, and the ability to accelerate the RHI application process to “lock in” the best available RHI tariff before any potential degression.
- Quicker payback period when compared to GSHP.
- Better average annual return when compared to GSHP.
- Far better reduction in carbon emissions than GSHP.
- Able to decommission all of the existing 4 oil-fired boilers (GSHP would require 1 oil-fired boiler to remain to support output in peak heating demand periods and provide a small percentage of the domestic hot water demand).

7. Costs of the preferred option

Please refer to Section 5 for Option 2 – Install a Biomass boiler and the detailed NPV calculation in Appendix 2.



POLICE & CRIME COMMISSIONER

8. Risks associated with the preferred option

Fuel price volatility	EMSCU will facilitate the set up of a long term fuel procurement strategy. Regional procurement frameworks will be used to secure the optimum price for wood pellets.
Fuel supply chain continuity	EMSCU will facilitate contract negotiation with suppliers to ensure continuity of supply and longevity of contract. Long term prospects for the supply of wood pellets are less volatile than for gas oil as it is an abundant and sustainable fuel source.
Timescales of tendering process	The procurement strategy has not yet been established for this project although it is anticipated that an EU procurement process will be required due to the value and nature of the works. The timescales for procurement are approximately 6-8 months if the EU procurement process is initiated. EMSCU will lead on this process to help avoid slippage.
Planning permission requirements	Planning permission will be sought before commissioning the system and commencing any install.
Spatial constraints	The Estates department will conduct site surveys in order to mitigate spatial issues as part of the project planning phase.
Existing pipe work insufficient for new boiler plant	Piping surveys to be done by Carbonzero prior to installation.
Not qualifying for RHI	The Estates department will work closely with the principal contractor, Carbonzero and regulator to mitigate this risk.
Degression in RHI rates during the application process	Decision to proceed with the recommended option as soon as possible will aide a quicker application and mitigate this risk. Once the application is accepted the rates are "locked in" for a guaranteed 20 years and rise in line with RPI.



Appendix 2

Retention of Sherwood Lodge	<p>Sherwood Lodge is not under retentive scrutiny as part of the Estates rationalisation plan to 2016.</p> <p>Investment of £5M capital was used to refurbish the site in 2009 with a view that this would sustain its viability for the foreseeable future.</p> <p>Sherwood Lodge is also situated on a 'green belt' site which limits the options for redevelopment and hence the commercial resale value. This negates any justification for selling the site at this current time.</p>
All prices as quoted for capital investment are currently estimations and subject to change	<p>Estimations were obtained through Carbonzero who sourced and verified this information with principal contractors who have a track record of these types of install.</p> <p>The recommended option for a Biomass system carries less inherent risk in unforeseen costs arising due to the less complex nature of the system and installation requirements.</p>

9. Timescales

Milestone/Deliverable

Design & specification
Procurement process
Start of installation
Completion of RHI
Completion of installation

Target Date

01/02/14
01/03/14 – 01/04/14
01/04/14
01/10/14 – 01/11/14
01/08/14



10. Project Team

Estates and Facilities Department, EMSCU, Carbonzero consultants, Principal & sub contractors.

11. Benefits Expected and Benefits Realisation

Financial

1. Savings of approximately £400,000 over 20 year period.
2. Revenue generation from Renewable Heat Incentive (RHI) of approximately £1.14m over 20 years.
3. Positive cash flows will be generated by year 9.
4. Positive cash flows will be generated by year 9 .

Performance/Productivity

Reduced carbon emissions by 183,000 Kg CO2 (per annum) equivalent over 20 years

Delivery - 2034

Measure - Reduction in carbon emissions

Data source - RHI consumption meter

Contact - Facilities & Estates

Frequency - annually

Baseline - 356,200kg CO2 equivalent

Other benefits to note in the narrative.

Operational Benefits

Minimised disruption during installation at FHQ.

Risk Mitigation

Minimal oil stored on site - reduced risk of spillage/leakage

Compliance to Standards

Compliance to PCC Corporate Social Responsibility policy

Quality Benefits

Ability to understand fuel consumption and costs. Enabling improved management and decision making.



Benefits and Measurement Plan							
Benefit No.	Benefit category	Measurement plan					
		Benefit delivery date	Benefit measure	Data source	Contact for measure	Frequency of measure	Baseline data
1	Financial Savings	2023	Savings accrued	Finance/e-financials	Business Partner	Annually	See NPV
2	Financial Savings	2034	Revenue accrued	Finance/e-financials	Business Partner	Annually	See NPV
3	Financial Savings	2023	NPV/Cash flow	Finance/e-financials	Business Partner	Annually	See NPV
4	Performance/Productivity	2034	Reduction in carbon emissions	RHI consumption meter	Facilities & Estates	Annually	356,200kg

12. Impact	
Business Area	Impact
HR	N/A
PCC	Will support CSR agenda of becoming a more sustainable force.
Regional Implications	N/A
Operating Model	N/A
L & D	N/A
Procurement	Procurement will assist when using frameworks to appoint contractors
Information Services	N/A
Estates	N/A
Finance (Business Partners)	Have been consulted. Ongoing work to document financial benefits
Information Management	N/A
Information Security Manager	PSD (Vetting) will be engaged to process contractors on site
Research	N/A
Business Benefits	The business realisation officer has been consulted
Corporate Communications	N/A
Equality Impact Assessment	N/A
Privacy Impact Assessment	N/A
Victim Focused	N/A

13. Project Spend
Refer to Appendix 2 NPV calculations for project spend and cash flow projections.

ADMINISTRATION

Business Case History

Document:

Location:

Revision History

Revision Date	Previous Revision Date	Author	Summary of Changes	Changes Marked

Approvals

Name	Title	Date of Issue	Version

Distribution

This document requires distribution to the business experts as follows. The PMO will circulate this business case to all parts of the business that should have site of and comment on this work. Full consultation needs to have taken place before this business case will be considered ready for submission to the Programme board for approval. A hard copy of the document should be held by the project manager with the appropriate signatures to confirm the document has been assessed.

Name	Business Area	Signature Confirm Assessed
Ronnie Adams	Procurement	
Christi Carson	Head of Information Services	
Paul Dudley	Business Benefits	
Keiley Freeman	Research	
Richard Hitch	Information Services	
Glen Langford	Information Management	
Jacky Lloyd Lindsey Stillings Jill Samuels	HR Business Partner HR Business Partner (Crime and Justice) HR Business Partner	
Pat Stocker	Information Security Manager	
Matt Tapp (Paul Coffey)	Corporate Communications	
Simon Tovey	Head of Business & Finance	
Ann Marie Hughes Andrea Naylor Sarah Odam	Business Partner (Corporate Services) Business Partner (Local Policing) Business Partner (Ops Support) DELETE AS APPROPRIATE	

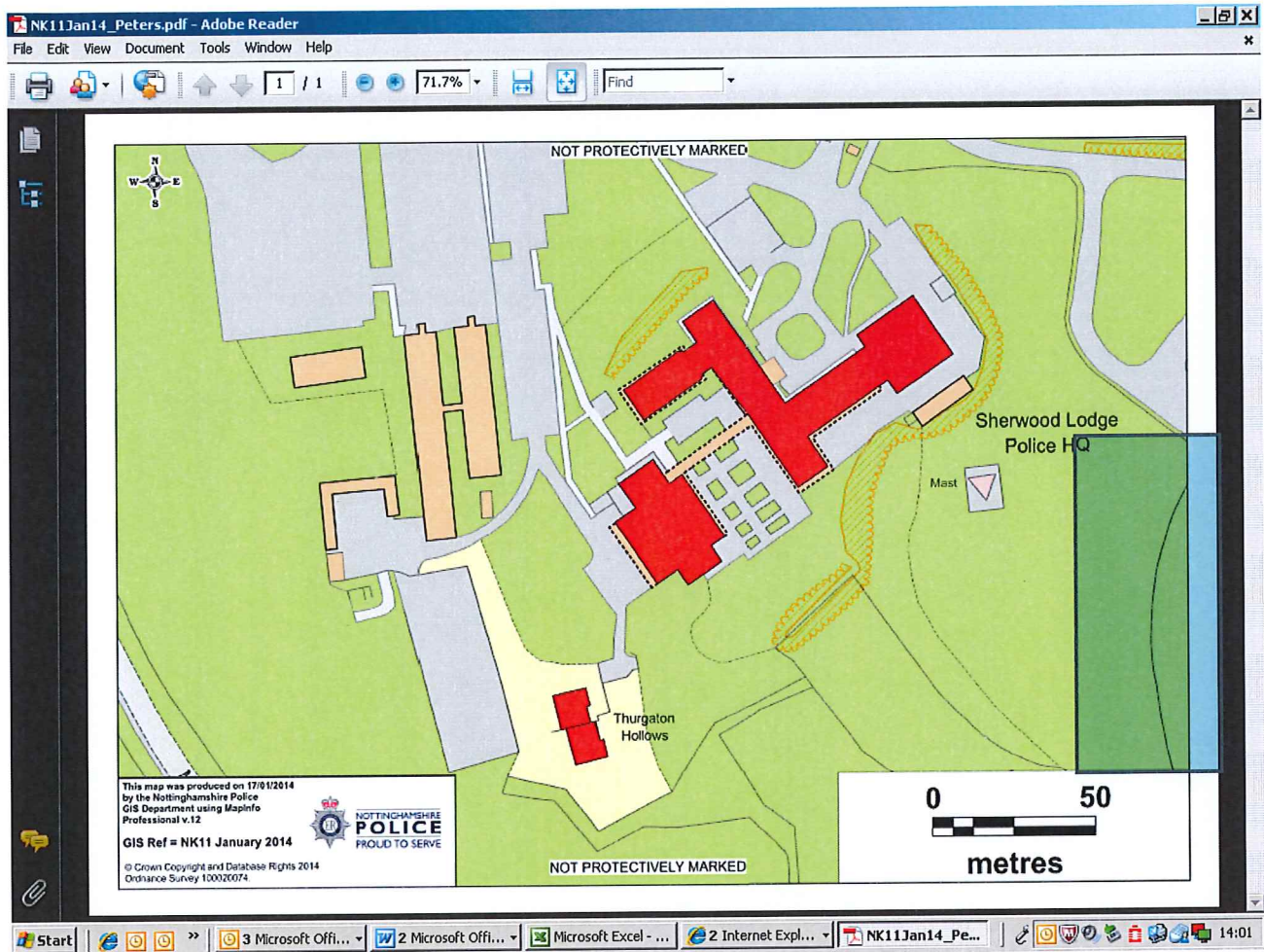


Appendix 2
POLICE & CRIME COMMISSIONER

Tim Wendels	Estates	
Ak Khan	Ch Supt, County Divisional Commander	
Simon Nickless	Ch Supt, City Divisional Commander	
Ian Howick	T/Ch Supt, Ops Support	
Helen Jebb	DCS, Head of Crime and Justice	
Pauline Smith	Head of Contact Management	
Ian Waterfield	CS	

Programme Management Office	
DATE RECEIVED	GOVERNING BOARD

Appendix 1 – Site map showing the areas affected (marked in red)





System Type	Capital Cost	Discounted Cashflow	Payback (Years)	Average Annual Revenue Saving	Average Annual Return	Annual CO2 Emissions (kg)
Ground Source Heat Pump 320KW	£ 900,000	£ 335,170	15	£ 14,722	2%	119,927
320w Biomass	£ 283,000	£ 678,578	6	£ 43,719	15%	31,281

Overarching assumptions/caveats:
Assumptions on demand and relative system size are based on the Carbonzero report and have been ratified by the Estates department
Assumptions on RHI tariffs are taken from www.ofgem.gov.uk - tariffs applicable for non-domestic RHI for Great Britain from December 2013
RHI tariffs are reviewed and published quarterly on the Ofgem website
No provision has been made for degression of RHI tariffs (occurs as uptake of RHI increases to ensure the scheme does not exceed its fixed annual budgets
Assumed RHI tariff applicable upon acceptance is "locked in" for the life of the project (confirmed by Carbonzero)
Specific cost and performance assumptions are appended to the individual NPV calculations for the 2 systems
Biomass system NPV calculation is based on wood pellets and not wood chips (prices and CO2 emissions vary materially between the 2 types of fuel)
Capital costs are based on current estimates from Carbonzero and could be subject to change
No provision has been made for any additional revenue costs of the project, e.g. decommissioning 3 of the 4 old oil-fired boilers, or additional consultancy fees, piping surveys etc
Cost of Capital is calculated on a 5% EIP (Equal Instalments of the Principle) loan over 20 years



Appendix 2
Nottinghamshire Police
NPV and Cashflow of Biomass Heating System
320 Biomass Heating System

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
	£	£	£	£	£	£	£	£	£	£
NPV										
Capital Cost	-283,000									
RHI Generation Income	27,149	27,964	28,803	29,667	30,557	31,473	32,418	33,390	34,392	35,424
Annual Energy Cost (renewable)	-33,472	-35,145	-36,902	-38,747	-40,685	-42,719	-44,855	-47,098	-49,453	-51,925
Annual Energy Cost (non-renewable)	-2,585	-2,714	-2,850	-2,993	-3,142	-3,299	-3,464	-3,638	-3,820	-4,011
Annual Servicing Cost to maintain system efficiency + £2000 admin costs	-5,000	-5,090	-5,183	-5,278	-5,377	-5,478	-5,582	-5,690	-5,800	-5,914
Annual Energy Cost Saving from de-commission of old system	57,137	59,994	62,994	66,144	69,451	72,923	76,569	80,398	84,418	88,639
NET TOTAL COSTS	-239,770	45,008	46,861	48,792	50,804	52,900	55,085	57,363	59,737	62,212
CUMULATIVE	-239,770	-194,762	-147,901	-99,109	-48,305	4,595	59,681	117,044	176,781	238,993
Discount Factor (3%)	1.00	0.97	0.94	0.92	0.89	0.86	0.84	0.81	0.79	0.77
Discounted Cash Flow	-239,770	43,697	44,171	44,651	45,138	45,632	46,133	46,641	47,157	47,680
Payback	-239,770	-196,073	-151,902	-107,250	-62,112	-16,479	29,654	76,295	123,452	171,132
Cashflow										
Capital Repayment	-14,150	-14,150	-14,150	-14,150	-14,150	-14,150	-14,150	-14,150	-14,150	-14,150
Interest @ 5%	-14,150	-13,443	-12,735	-12,028	-11,320	-10,613	-9,905	-9,198	-8,490	-7,783
RHI Generation Income	27,149	27,964	28,803	29,667	30,557	31,473	32,418	33,390	34,392	35,424
Net Energy Cost Saving	16,081	17,045	18,059	19,125	20,247	21,427	22,668	23,973	25,345	26,788
ANNUAL CASHFLOW	14,930	17,416	19,976	22,614	25,334	28,138	31,030	34,015	37,097	40,280
Revenue net saving (trackable)	43,230	45,008	46,861	48,792	50,804	52,900	55,085	57,363	59,737	62,212
Funding Cost	-14,150	-13,443	-12,735	-12,028	-11,320	-10,613	-9,905	-9,198	-8,490	-7,783
	29,080	31,566	34,126	36,764	39,484	42,288	45,180	48,165	51,247	54,430
Assumptions										
Peak heating demand in kW	320	320	320	320	320	320	320	320	320	320
Annual increase in peak heating demand	0%									
Annual total heating demand in MWh (1MWh = 1,000 kWh)	750									
Annual domestic hot water (DHW) demand in kWh	-	??								
Annual total heating and DHW demand in kWh	749,627	749,627	749,627	749,627	749,627	749,627	749,627	749,627	749,627	749,627
Old System KWH	828,076	828,076	828,076	828,076	828,076	828,076	828,076	828,076	828,076	828,076
Annual increase in total heating and DHW demand	0%									
Demand met by new system	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Demand met by old system (1 remaining oil boiler)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Biomass boiler efficiency	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
System degradation (efficiency)	0%									
Cost of wood pellet per kWh	£ 0.047	£ 0.049	£ 0.052	£ 0.054	£ 0.057	£ 0.060	£ 0.063	£ 0.066	£ 0.069	£ 0.073
Annual inflation rate for wood pellet	5%									
Annual servicing costs (nominal)	£ 3,000	£ 3,090	£ 3,183	£ 3,278	£ 3,377	£ 3,478	£ 3,582	£ 3,690	£ 3,800	£ 3,914
Annual inflation rate (not including fuel)	3%									
Cost of oil to run oil boilers per kWh	£ 0.07	£ 0.07	£ 0.08	£ 0.08	£ 0.08	£ 0.09	£ 0.09	£ 0.10	£ 0.10	£ 0.11
Annual inflation rate for fuel oil	5%									
RHI Generation Income per kWh (Tier 1)	£ 0.050	£ 0.052	£ 0.053	£ 0.055	£ 0.056	£ 0.058	£ 0.060	£ 0.061	£ 0.063	£ 0.065
Annual inflation rate for RHI	3%									
RHI Generation Income per kWh (Tier 2)	£ 0.021	£ 0.022	£ 0.022	£ 0.023	£ 0.024	£ 0.024	£ 0.025	£ 0.026	£ 0.027	£ 0.027
Annual inflation rate for RHI	3%									
Eligible kWh hours at Tier 1 tariff (1,314 hours x capacity 320kW)	420,480	420,480	420,480	420,480	420,480	420,480	420,480	420,480	420,480	420,480
Eligible kWh hours at Tier 2 tariff (911.5 hours x capacity 320kW)	291,680	291,680	291,680	291,680	291,680	291,680	291,680	291,680	291,680	291,680
Total kWh eligible for tariff	712,160	712,160	712,160	712,160	712,160	712,160	712,160	712,160	712,160	712,160
	0									
CO2 emissions:	712,160	1								
Heating Oil = 0.274 kgCO2/kWh	11,340									
Biomass Pelletts = 0.028 kgCO2/kWh	19,940									

