



# Natural Capital Account for Silverdale Country Park

*Understanding the wider environmental, monetary and natural capital benefits of the management and conservation of Silverdale Country Park.*

Prepared for



Prepared by Interserve Consulting  
Sustainable Business Advisory  
January 2017

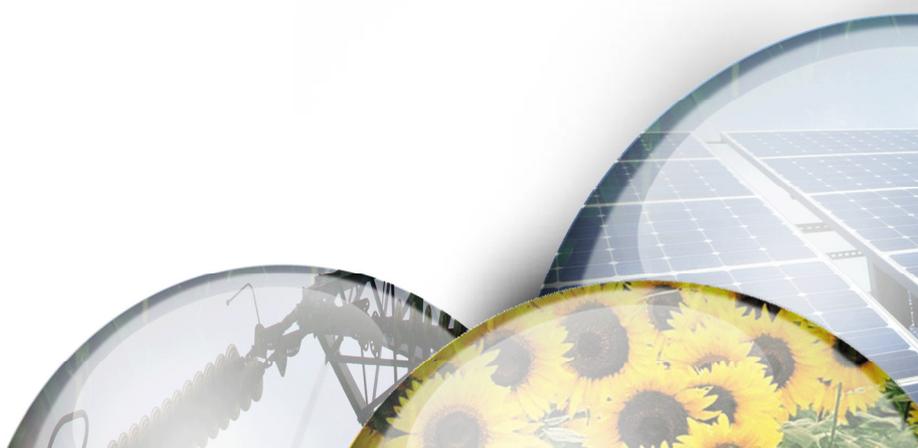
*Interserve Consulting - Sustainability Business Advisory*

*Redefining the future for people and places*

395 George Road  
Erdington  
Birmingham  
B23 7RZ

Alex Osborne-Saponja  
Senior Consultant  
alex.saponja@interserve.com  
07970161935





## Executive Summary

An ecosystem services and natural capital monetary assessment has been undertaken by Interserve Consulting, in order to understand the wider economic value and benefits of the Land Trust owned site, Silverdale Country Park.

This assessment follows on from the value of green spaces work, to generate a quantitative assessment based on the natural and underlying cycles of the park.

Both physical and monetary accounts have been produced, and are available as appendices at the back of this report, making use of academic, commercial and economic models based on real site data, unless otherwise stated.

The annual economic value of Silverdale Country Park is estimated at £2.6 million, with the main benefits perceived as carbon storage and sequestration; water retention, storage, purification and flood alleviation and; health and education benefits to the local population based on the use of the park area.

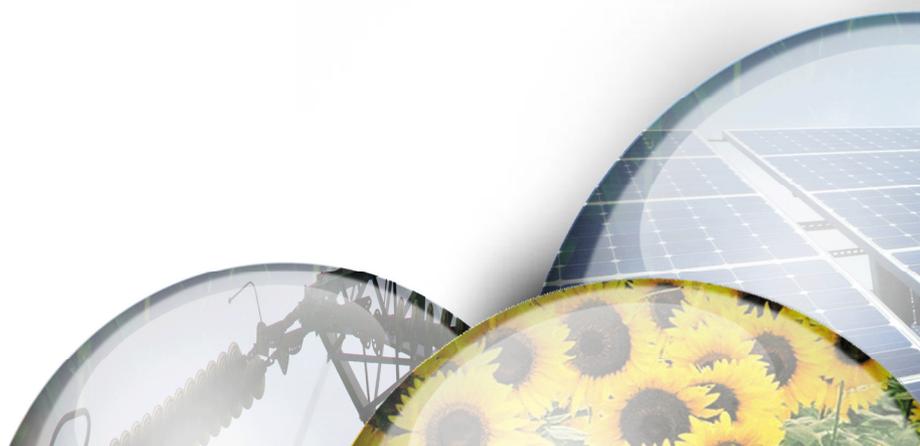
Furthermore, by making use of the models outlined within the main body of the report, it has been possible to understand the wider health benefit of the habitats on site, relating to air pollution, and local health costs.

The outcomes of the report discuss potential further benefits to the Land Trust and the local population through the management of land for the promotion of biodiversity and the wider benefits of this.

By understanding the wider value that green spaces, such as Silverdale Country Park, bring, it is possible to understand risk, increase resilience, aid in better decision making when it comes to the management of green space relating to the environment, society and the wider economy, and aid investment to bring about local positive impacts.

## Contents

Executive Summary .....	2
Introduction .....	4
Methodology.....	7
Outcomes .....	9
Conclusions.....	20
Appendix A - Natural Capital Account for Silverdale Country Park .....	22



## Introduction

An ecosystem services and natural capital valuation has been undertaken of the Land Trust owned site, Silverdale Country Park, located in North Staffordshire.

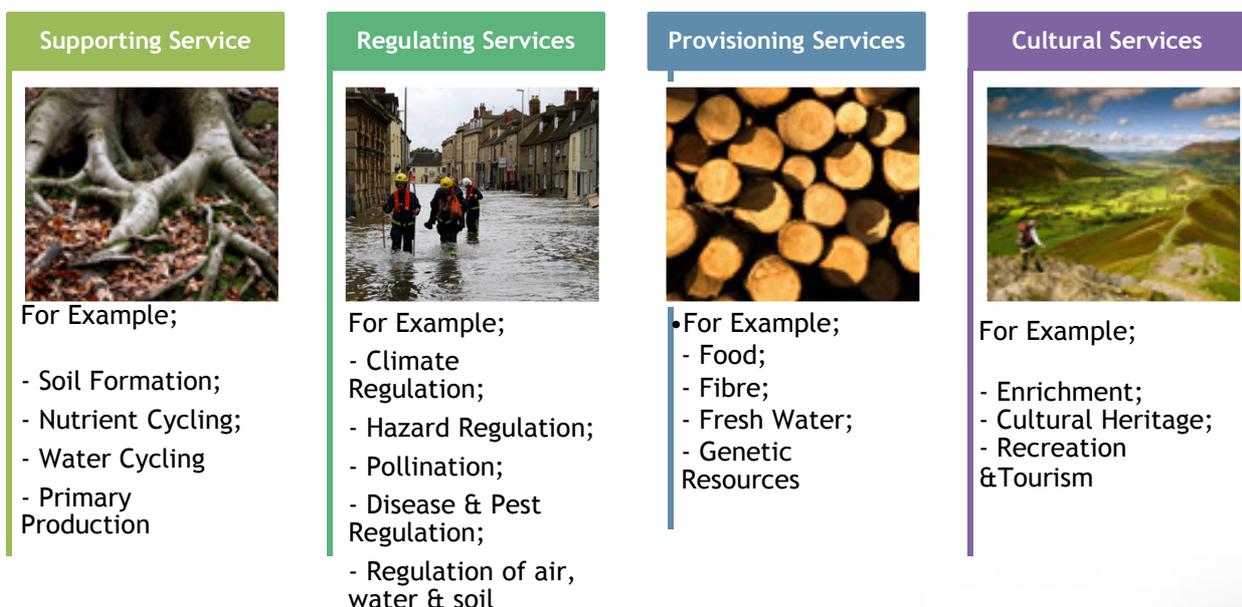
Silverdale Country Park is a former colliery which was closed in 1998, and had been a working iron works and mine since 1782. The site was transferred to the Homes and Community Agency, and then to the Land Trust, who ensure that open spaces can be used by the local community. Currently Groundwork West Midlands manage the site, and the site has been managed to incorporate footpaths for multiple activity use, and now consists of woodland, amenity grassland, a lake and wetland.

The aim of this document is to outline the wider economic benefits that are often not considered, or valued as “free” of the habitat and biodiversity within Silverdale Country Park.

It is hoped that this document will highlight the wider environmental and knock-on social value of the site in terms of the goods and services, ecosystem services, that the site delivers, and aid in understanding the wider intrinsic return on investment.

Ecosystem Services are the benefits providing by ecosystems which deliver material and non-material benefits, such as food and water, and recreational and aesthetic appeal. The breakdown of some of the extensive services offered by nature, as outlined by the UK National Ecosystem Services Assessment (UKNEA) is demonstrated in Figure 1 below.

Figure 1; Ecosystem Services Classification<sup>1</sup>



<sup>1</sup> UK National Ecosystem Services Assessment

Silverdale Country Park was selected for this assessment given its importance in the local community both during its time as an industrial site, and now as a place of biodiversity importance and an open space for recreation.

It is hoped that by performing this assessment, the figures will aid the Land Trust in understanding what their investment brings about to the wider community and the environment.

The main objectives of the assessment are as follows;

- To understand how the ongoing investment in Silverdale Country Park results in wider environmental and social benefit;
- Understand how the wider benefits can aid in supporting future investment of open spaces for community benefit;
- Demonstrate the business case for enhancement of open spaces through the monetisation of ecosystem services.

The assessment focusses on the entire park area as depicted in Figure 2 below.

*Figure 2; Silverdale Country Park<sup>2</sup>*



In order to break the assessment down, Interserve Consulting have focussed on the key habitat areas as follows;

- Amenity Grassland - 51.2 ha;
- Lakes and Wetland - 11 ha;
- Woodland - 15 ha;
- Wildflower Meadows (Conservation Grassland) - 11.2 ha.

<sup>2</sup> The Land Trust

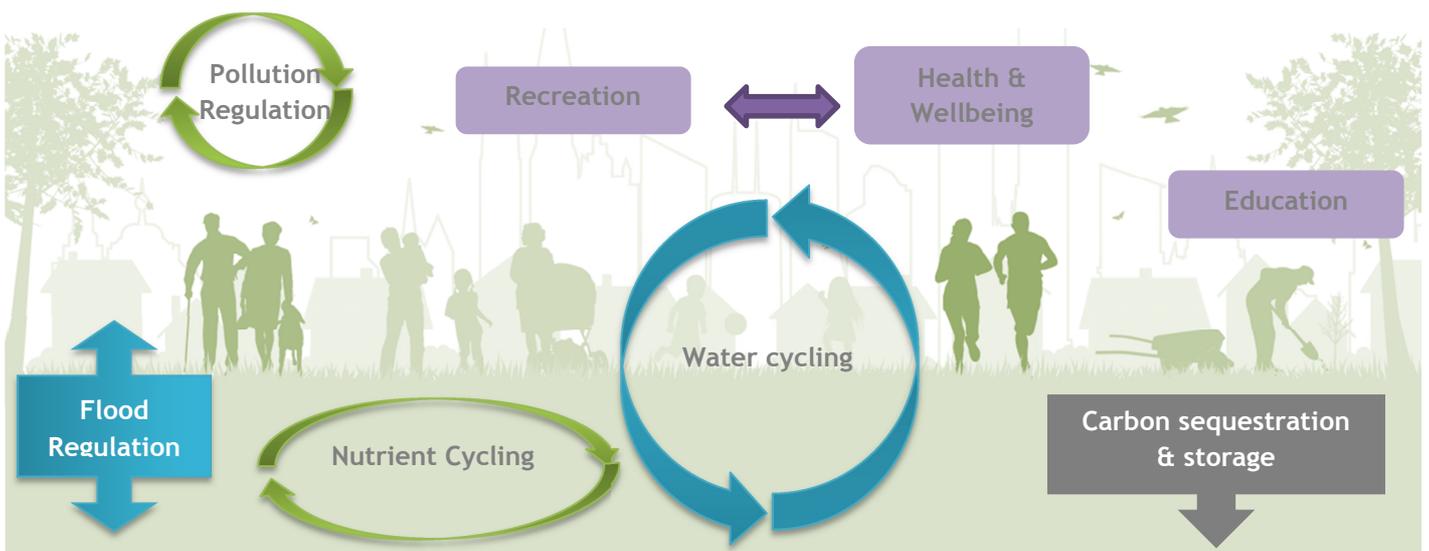
From discussions with the Land Trust, it was decided that all ecosystem services, as defined by the National Ecosystems Assessment should be assessed and valued, making use of available methodologies. Therefore a physical and monetary account has been modelled and calculated for the following headed services;

- Air Pollution & Regulation;
- Carbon;
- Soil;
- Wetland carbon and water regulation;
- Flood prevention and water balancing offered by the lake;
- Water;
- Education;
- Health and wellbeing.

Within each of the above elements there are further supporting themes and services that support the calculation outcomes, which will be discussed in the following section of this report.

The vital services provided by Silverdale Country Park are highlighted below in Figure 3.

*Figure 3; Services Provided by Silverdale Country Park*

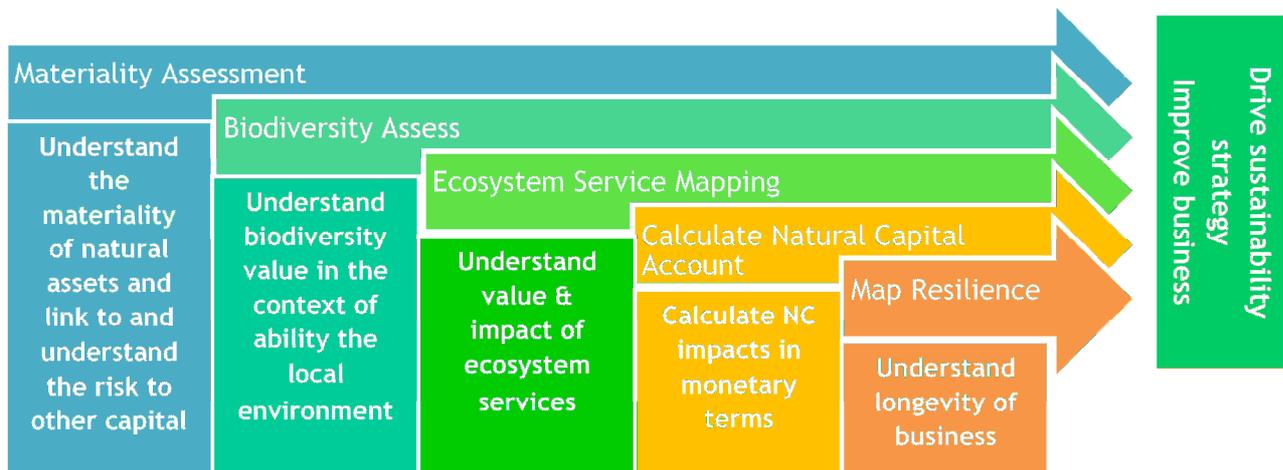


## Methodology

The valuation makes use of the Interserve Consulting Natural Capital Valuation Tool, whereby the ecosystem services, as highlighted in Figure 3 in the previous section, important to the site and the Land Trust’s charitable aims have been established.

The tool follows a five step process, as highlighted in Figure 4 below.

*Figure 4; The Interserve Consulting Approach to Natural Capital Valuation*



In order to meet the valuation needs and scope of the assessment at Silverdale, Interserve have mapped ecosystem services, calculated a physical and monetary natural capital account based on this, and mapped resilience through the prior two processes.

The tool draws on local data, where available, to determine wider environmental and socio-environmental benefit of Silverdale Country Park, academic and commercial data and underlying principles such as high level habitat carbon sequestration, and typical soil cycles.

The social price of carbon and water have been applied, along with health and well-being benefits of air quality reduction, and data has been used from the National Ecosystem Assessment as a minimum where there is patchy economic guidance or evidence.

The social price of carbon<sup>3</sup> is based on Dynamic Integrated Climate Emissions (DICE) Model initially based on Yosemite National Park, applied at wider economic scale, globally, with differing economies/ industries and risks based on a changing climate.

The price accounts for the following;

- ❖ Decreased agricultural yields, harm to human health and lower worker productivity, all related to climate change;
- ❖ It takes into consideration the impacts that climate change will have on the growth rate of the economy;

<sup>3</sup> <http://news.stanford.edu/2015/01/12/emissions-social-costs-011215/>

- ❖ Accounts for the investment required to adapt to climate change;
- ❖ Models the differing economic status of different countries, accounting for “climate poverty”.

A resilience model has been applied based on the UK Climate Change Projections<sup>4</sup> released in 2009, and a medium emissions scenario has been utilised to understand the impact.

Net Present Value (NPV) calculations have been used to determine value over a period, to understand the return of natural capital over a ten year period based on the current value invested to manage the site.

Very high level hedonic formulation has been utilised to understand the value add to house prices adjacent to the park, and further work can be undertaken to build on this if required.

The model has been applied to the following high level services, based on current conditions, a pre-Land Trust scenario, and potential value of the site in ten years;

- ❖ Air pollution;
- ❖ Carbon dioxide emissions;
- ❖ Soil;
- ❖ Wetland water and carbon;
- ❖ Lake water regulation;
- ❖ Water;
- ❖ Education;
- ❖ Health and Well-being.

The model is based on current management practices and site use, and the change in habitat quality since before the Land Trust took over the management of the site. This is based on data and reports provided by the Land Trust and Groundwork.

As natural capital valuation is a constantly developing field, in some areas assumptions have been made, and these will be made clear, therefore there will be general figure, rather than a site specific figure applied, however this does provides something to work from should the Land Trust wish to look into these areas in particular.

These valuations link to wider social impacts, and should the Land Trust wish to understand these further, Interserve can put these into our Social Mapping Tool which makes use of GIS, to understand specific social impacts for a specific area, although is data dependent.

The large bulk of the calculations have been based on current site conditions, with future impacts based on no change to the current management investment and NPV calculations, and previous value based on the available site data.

Where previous site data wasn't available, we have made use of the biodiversity valuation model (See Figure 4) in order to factorise based on the data that is available.

---

<sup>4</sup> <http://ukclimateprojections.metoffice.gov.uk/media.jsp?mediaid=87894&filetype=pdf>

## Outcomes

### *Air Pollution*

Air pollution has been reviewed based on local air quality data for Newcastle-under-Lyme as an average<sup>5</sup>, which is relatively low, and well in line with the National Air Quality Objectives.

The deposition rate has been calculated for the following habitat types within Silverdale Country Park;

- ❖ Woodland;
- ❖ Grassland and;
- ❖ Wildflowers.

The overall current amount of air pollution absorbed per year is calculated at 227kgs/annum, broken down as demonstrated in Table 1 below.

*Table 1; Silverdale Country Park Annual Air Pollution Absorption*

	PM <sub>10</sub>	NO <sub>x</sub>	SO <sub>x</sub>	Total
Woodland	12.7 kgs	80.7 kgs	80.8 kgs	174 kgs
Grassland	3.6 kgs	21.8 kgs	21.8 kgs	47.3 kgs
Wildflowers	0.41 kgs	2.47 kgs	2.48 kgs	5.36 kgs

It is clear, that despite woodland being much smaller in total area of the park, that this is the main contributor to the reduction in such air pollution in the local area. These pollutants have been modelled, as not only do they contribute to environmental degradation, they also pose a threat to human health via respiratory and cardiac diseases.

Demographic data<sup>6</sup> for the area has been utilised, to determine the mortality and hospital admission rates, associated with air pollution causing such health impacts.

Based on this, a value associated with the reduced hospital admissions to the local area has been calculated of £419 per annum based on the University of Newcastle Report to the Forestry Commission methodology<sup>7</sup>.

<sup>5</sup> [https://uk-air.defra.gov.uk/aqma/details?aqma\\_id=1067](https://uk-air.defra.gov.uk/aqma/details?aqma_id=1067)

<sup>6</sup> <http://ukcensusdata.com/staffordshire-e10000028>

<sup>7</sup> [http://www.forestry.gov.uk/pdf/airpollf.pdf/\\$file/airpollf.pdf](http://www.forestry.gov.uk/pdf/airpollf.pdf/$file/airpollf.pdf)

This may seem like a relatively low value, however given the location of the park and the low air pollution levels in the area the impact to human health is low. However, if the park was located in an area with poorer air quality, such as a more urban environment, or closer to busy roads, the monetary value would be greater.

Before the management of the site by the Land Trust, it is thought that the value of air pollution absorption was less, as there was less woodland, and the grassland areas were not as developed as they are now. This is based on a biodiversity score of 36 prior to Land Trust involvement, compared with a current score of 110.

Going forward, it's expected that there will be a perceived decrease in the level of air pollution in the area, due to changing technology, and emissions controls put in cars. However, due to the recent emissions scandals, Interserve have modelled the value going forward based on current pollution levels. In order to understand the value going forward, the management value invested into the site has been averaged out and modelled as a relative constant, and the net present value calculated to demonstrate the future value based on continued investment.

The forward value does not take into account any increase in specific habitat, or an increase in population.

It has been calculated that there has been an increase in air pollution absorption of 113% since the Land Trust started to invest into the site, as there has been an improvement and an increase, in the habitat that absorbs air pollutants since Silverdale has been actively managed via the Land Trust. Going forward it is expected that there will be an extra increase of 38%, as habitat further develops, especially recently planted trees. The change in monetary impact is highlighted below in Figure 5.

*Figure 5; Change in Air Pollution Absorption Value of Silverdale Country Park*



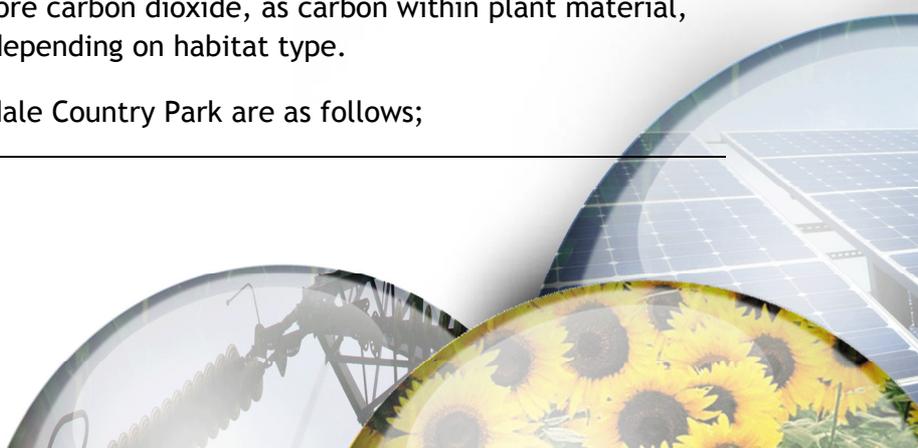
### *Carbon Dioxide Emissions*

---

Carbon emissions have been assessed based on the current habitat's ability to absorb/sequester carbon dioxide, store carbon dioxide, as carbon within plant material, and carbon sequestered by the soil depending on habitat type.

The habitats modelled within Silverdale Country Park are as follows;

---



- ❖ Amenity Grassland;
- ❖ Woodland and;
- ❖ Wildflower Meadow and Conservation Grassland.

Standard factors<sup>8</sup> have been used to calculate the carbon sequestered for each habitat type, as with the soil type that supports each of the habitats, and it is assumed that these are of good quality and condition.

Further to this, the carbon stored already within each of the habitats has been calculated to give an overall figure to determine an accurate demonstration of how the park helps regulate climate change via carbon dioxide storage and sequestration.

Currently the total carbon stored within the aforementioned habitats is 1,107 tCO<sub>2</sub>e, this will increase with plant growth/ habitat increase.

The total carbon sequestered per year by vegetation within the park area is 417 tCO<sub>2</sub>e, whilst the soil habitat sequesters 4,470 tCO<sub>2</sub>e per year.

Presently, the total amount of carbon dioxide stored and sequestered is 5,994 tCO<sub>2</sub>e within the terrestrial habitats, the split is highlighted in Table 2 below.

*Table 2; Carbon Storage and Sequestration by Habitat Type at Silverdale Country Park*

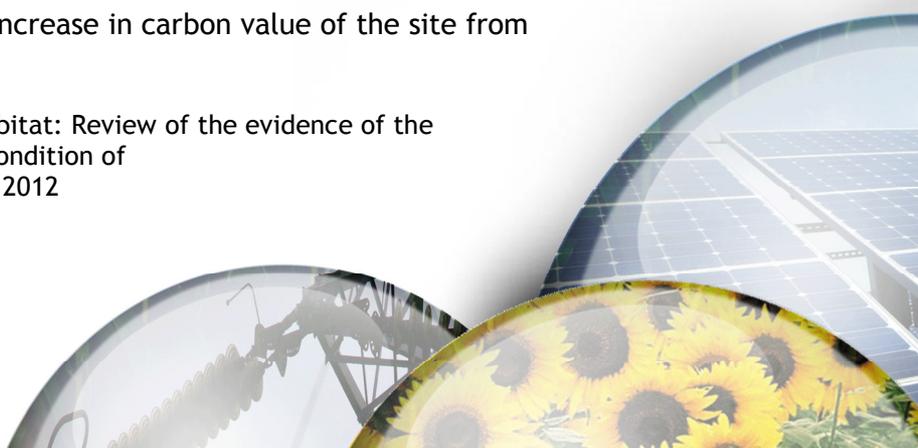
	CO <sub>2</sub> e Stored	CO <sub>2</sub> e Sequestered per Annum	Total
Amenity Grassland	51	3,078	3,129
Woodland	1,050	1,238	2,288
Wildflower & Conservation Grassland	6	572	578

From the above table it is clear that amenity grassland sequesters the most carbon each year, this is due to the area of amenity grassland, which is nearly 3.5 times greater than the woodland habitat area, however woodland has much greater absorption capability.

As discussed, a social price of carbon has been applied, which at the time of calculation was £157/tCO<sub>2</sub>e, therefore the overall net value of stored and sequestered carbon is £841,650 for the current annual period, excluding a perceived value of £3,455 from wetland carbon sequestration.

It's thought that there has been an increase in carbon value of the site from

<sup>8</sup> Natural England, Carbon storage by habitat: Review of the evidence of the impacts of management decisions and condition of carbon stores and sources, Alonso Et al, 2012



approximately £281,946 pre-Land Trust involvement to the current value, due to an increase in woodland habitat areas, increased habitat condition and improved soil.

Based on net present value calculation the perceived value over 10 years, without any change in management practices or habitat type or areas, and based on the current investment of management fees is £6.6 million. This does not take into consideration the current carbon storage value.

The overall monetary benefit adds to overall global GDP and GVA as a result in abated emissions, and reduced atmospheric carbon dioxide contributing to climate change.

### *Soil*

---

Soil has been assessed based on a previous report undertaken in 2009 based on nitrogen, phosphorous and organic matter concentrations.

At the time of the report it was determined that the quality of the soil was relatively poor based on the ideal requirements for the habitat at the time.

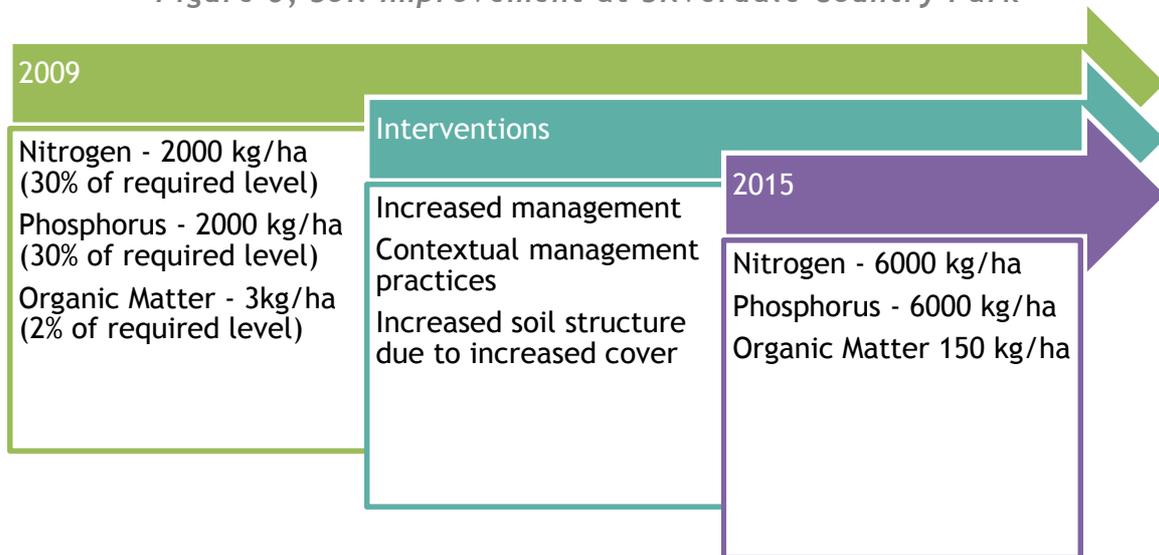
It has been assumed that based on habitat development, and the high biodiversity value of the site, that soil on site meets the ideal requirements i.e. there has been a level of improvement that is consistent with that typical for each of the habitat types. Should there be more recent soil data, this would aid in understanding the true improvement of the soil environment, and more accurate values can be applied.

As this is only an assumption, the figures therefore are only speculative, and need to be backed up with further soil assessments in order to accurately value soil in both physical and monetary terms.

As the quality of the habitat at Silverdale is good, as determined by a high level biodiversity valuation, it is assumed that the soil is at the quality required to support good quality habitat and as such been valued in line with this thinking.

At present it is thought that the soil (since 2009) has improved as demonstrated in Figure 6 overleaf.

Figure 6; Soil Improvement at Silverdale Country Park



In order to understand the economic value of soil, Interserve review the impacts on wider nutrient cycles, which link to climate change in the case of the nitrogen cycle, which can then be factored against the social price of carbon and extrapolated accordingly based on global warming potential.

Equally, given that nitrogen is important given the need to support food producing systems, as well it's wider role in health, functioning ecosystems, and it's degradation beyond planetary boundaries, a high monetary value should be applied in order to demonstrate the magnitude of a loss or value, and the links to other nutrient cycles.

The current net value of soil is thought to be £233,563/annum based on the previous assertions. It's thought that the value in 2009, due to the sub-par quality of the soil was -£206,940.

In some areas, there has been some natural succession from grassland to wetland, and this would aid in healthier nitrogen cycling overall, due to the high organic matter content of this habitat type.

Without any further change in management practices or a change in the habitat within the Park the value of the soil in ten years is approximately £320,498/annum, considering nitrogen and phosphorus content only, as this is the only data currently available.

This means greater overall GDP and GVA add, at a wider national level, through a working nitrogen cycle which does not impact on production losses, increases in flood resilience and reduces insurance claims, and mitigates the impacts of nitrogen-species on climate change.

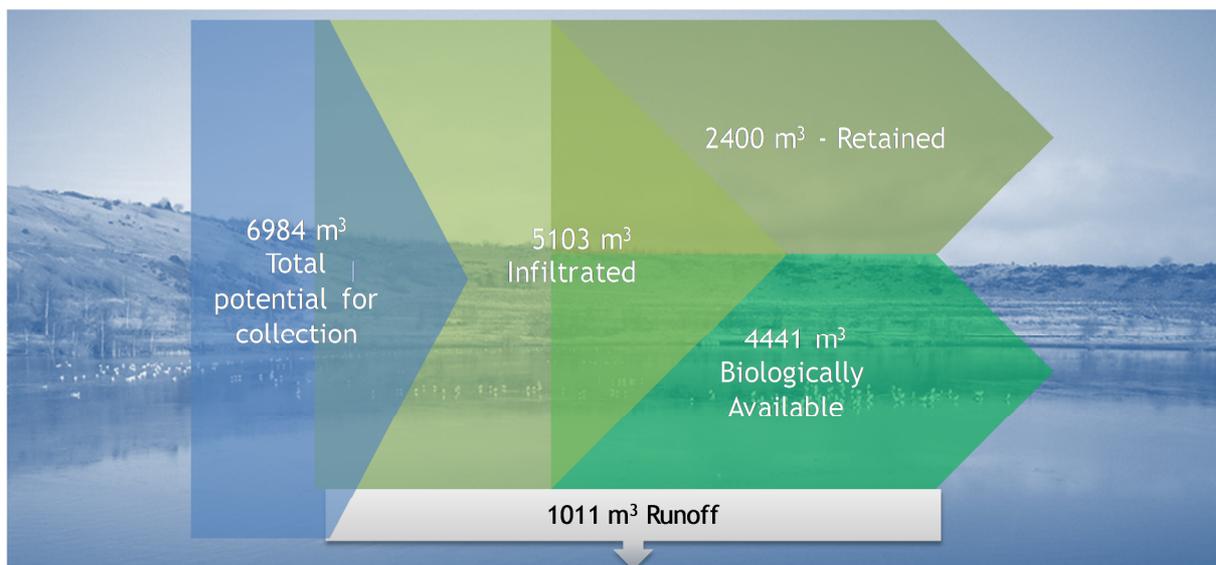


## Water

Water has been assessed in several different ways, this section details water infiltration/collection within the defined habitats at Silverdale Country Park.

Based on rainfall statistics for the area, the total collectable water within the park is approximately 6,984m<sup>3</sup>/annum<sup>9</sup>, the water capture and associated pathways that water takes as a result is demonstrated in Figure 7 below.

*Figure 7; Water Pathways within Silverdale Country Park*



From Figure 7, it is clear that a large amount of water is collected via the park, of this a large amount infiltrates the park habitats, is retained within wetland, soil and the lake, with some of this water becoming biologically available throughout the water cycle processes. A large proportion of water that is infiltrated enters biological systems straight away i.e. plant uptake for growth, transpiration and evaporation.

Fourteen percent of all water has been calculated as going to runoff, largely via pathways and non-permeable surfaces, and in some areas where there is low vegetation cover due to gradient, and low soil and organic matter development.

This has been calculated based on standard soil filtration rates for UK grassland habitats, however this may be greater due to clay loam nature of the soil at Silverdale. In order to better understand actual runoff and the value associated with this, more understanding of the runoff and retention capacity of the site, and the value associated with this.

In order to understand the role of the park in the local water cycle going forward, Interserve has reviewed UK climate project data for the area, and the water scarcity percentage calculated by The Environment Agency.

<sup>9</sup> Keele Climate <http://www.metoffice.gov.uk/public/weather/climate/gcqmke11>

Climate projections based on the medium scenario<sup>10</sup> impact demonstrate an increase in rainfall of 5% over the next 10 years, whilst current water scarcity rates are calculated at 40%, which impacts on the social price of water<sup>11</sup> used in the valuation process.

Water availability therefore is expected to increase, however the habitat areas are thought to be able to deal with this, without a large increase in runoff, or adding to runoff issues downstream from the park.

The total value of water processes within Silverdale Country Park is currently calculated at £82,061/annum. The current value is contributed by water infiltration, retention, runoff and biological availability of the differing areas within the Park, this is demonstrated in Table 3 below.

*Table 3; Water Value within Silverdale Country Park*

	Collectable Water Value	Infiltrated Water Value	Runoff Value	Retention Value	Water added to Biological Processes
Amenity Grassland	£18,525	£13,894	-£4,631	£4,168	£9,726
Woodland	£5,427	£5,427	£0	£1,628	£3,799
Wildflower Meadow & Conservation Grassland	£4,052	£4,052	£0	£1,216	£2,837
Lakes & Wetland	£3,980	£0	£0	£3,980	£3,980

Over a ten year period, the value of the water within the system is expected to increase to approximately £84,886/annum (by year 10), based on an increase in rainfall of 5%, and NPV calculations based on the current rate of investment into the site, this does not account for a change in the value of water.

This does not take into account any increase in wetland, which potentially could occur, as natural succession to wetland has taken place already on site.

### *Wider Lake & Wetland Benefits*

---

<sup>10</sup> <http://ukclimateprojections.metoffice.gov.uk/>

<sup>11</sup> WBCSD

In addition to the benefits outlined in the previous section, the lake and the wetland offer further benefits, beyond water regulation and purification in terms of the following;

- Flood alleviation from the lake and the potential capacity of the developing wetland ecosystem due to the introduction of Heritage Park;
- Wider climate resilience.

The lake area already serves as a balancing tank, or natural sustainable drainage system within the context of the local landscape, offering embedded resilience to the Silverdale area. This ensures that water does not over burden the local community through a capture and release type system.

Although the Heritage Park area is not perceived to be at risk from flooding<sup>12</sup> based on Environment Agency data, a large rainfall event could impact the housing estate, however it is thought that Silverdale Country Park aids in flood alleviation of this site. There is a risk to Silverdale village further downstream from the Park, therefore the introduction of the Park and the wider landscaping through the Heritage Park estate, which can potentially guide the water through a landscaped “green” swale, will add further resilience, which has not been accounted for.

It is thought that the value of the lake and wetland to Heritage Park only, in terms of flood prevention is £383,849 per annum (currently, based on NEA modelled figures<sup>13</sup>), and over a ten year period would be worth £491,040 when net present value is taken into consideration. This value could be much greater when taking into consideration the wider Silverdale area, and the flood risk posed to the wider area.

Further to this there has been a succession from grassland to wetland, which is likely to be adding to flood regulation and prevention on a larger scale than modelled. In order to better understand the true extent of this, more data and information regarding the hydrology and geology of the extended wetland area would be required.

For now assumptions have been made relating to the depth and soil conditions of the wetland habitat, and the wider reed bed and swale/drainage ditch areas have not been considered within this analysis, as more data would be required in order to better understand the full ecosystem benefit relating to water.

As more wetland develops there is both the possibility to regulate more water, and also sequester more carbon, than the current grassland area. However, as more wetland develops, the wetland could become an overall net source of carbon due to increased microbial action, and therefore the Land Trust should understand the context of the site, and how to best manage this natural succession to both the benefit of the environment and the local community, as this habitat type is a priority habitat for Staffordshire.

Further to this, the wetland and lake areas in particular (in addition to the wider habitat areas) provide natural cooling to the local microclimate, should the park continue to be

---

<sup>12</sup> Silverdale [Flood Mapping](#)

<sup>13</sup> NEA Chapter 9 Freshwaters

managed in such a way, without too much change in the current habitat areas, then the park will provide a cooling effect which will combat the perceived increase in temperature over the next ten years based on climate change projections, of 2°C.

It is currently difficult to put a wider environmental and social value on this due to the lack of data<sup>14</sup>, although undertaking a Dynamic Integrated Climate Assessment Model (DICE) for the local area, using specific bought shadow pricing data, would aid in a specific cost relating to this.

### *Enviro-Social Benefits*

---

Health and wellbeing and educational benefits have been evaluated with an end economic value estimated based on site visits for different levels of students at different points in their schooling, and the health and well-being benefits of use of the park by the local community within 1km<sup>2</sup> of the park.

Geographic metrics such as factors relating to the likelihood of the local population making use of the park relating to wider social economic work undertaken by Mourato<sup>15</sup> as part of the NEA work.

For the local area it has been determined that on average 89% of the local population will make use of Silverdale Country Park, either through direct use, or indirect aesthetic value, and overall average factor of -5% has been utilised for the sake of this exercise, and has also been applied to the wider GVA figures for the benefits of education relating to the site.

Qualitative assessment of site users within the vicinity of the local area would be required in order to accurately assess the true use of the park by the local population.

Overall the current net value of Education relating to school and educational visits and wider use of Silverdale Country Park is calculated at £698,993 per annum (based on 2015 data).

This is a forward looking figure, derived from the likelihood of school children going on to complete wider secondary science based education and the overall added GVA based on the local average wages of individuals who complete, at minimum secondary education. With further more in depth social data this could be mapped to understand the value in more detail.

The figure is based on data provided by the Land Trust, from quarterly reports, and should the level of engagement with schools continue in the same manner then the value in ten years could be worth £964,721 per annum.

It's thought that the value of engagement with schools has increased by 78% (potentially more) since before the involvement and management from the Land Trust, based on data

---

<sup>14</sup> NEA Chapter 14 Regulating Services

<sup>15</sup> UK NEA Economic Analysis Report, Economic Analysis of Cultural Services, Susana Mourato Et al, December 2010

provided. Even between the 2014 and 2015 periods there is an anticipated increase year on year of 16% due to increased engagement with schools during this period.

Therefore should there be an increased engagement going forward, the value of such cultural services would increase further, beyond the value >£900k value previously stated.

In terms of health and well-being benefit, monetary values have been modelled based on house numbers in the local area (with 1km), including Heritage Park. Values, have been factorised based on the following;

- ❖ Views of green space;
- ❖ Use of non-countryside green space;
- ❖ Proximity to freshwater;
- ❖ Proximity of enclosed farmland and;
- ❖ Proximity to mixed woodland.

The values generated do not take into consideration the benefits of air pollution absorbed as discussed earlier within this document.

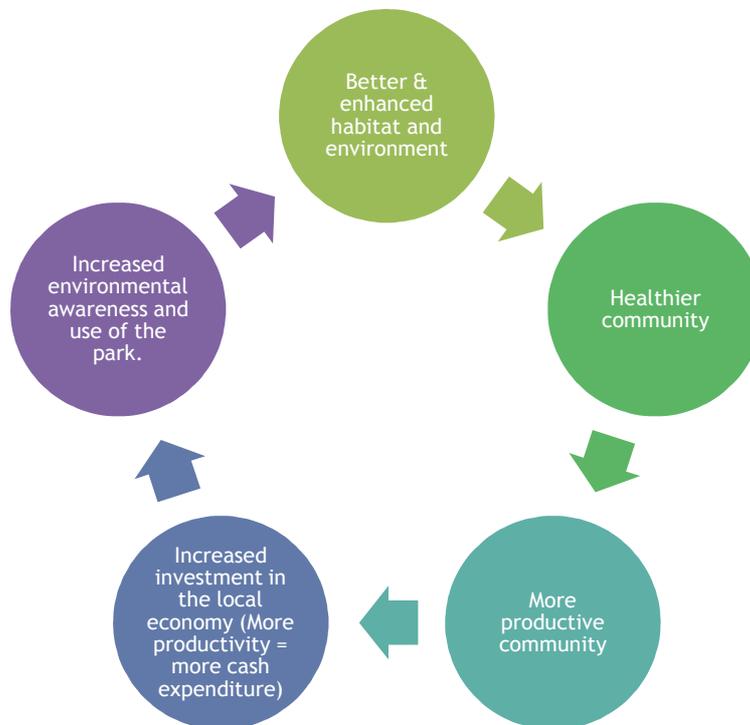
The overall current net value has been calculated at £380,849 per annum, with an expected increase in value to £536,756 per annum in ten years, assuming that there isn't any further housing close to the park during this time.

It is believed that there has been a large increase in the wider value that the Park brings from a health and well-being viewpoint due to the construction and development of the Heritage Park housing estate.

If the park didn't exist, then there wouldn't be the wider economic impacts discussed within this document.

As a result of the Park there is a contribution to a community wide virtuous circle, and aids in meeting principles associated with the circular economy via a more informed and healthier workforce, a perceived ability to help aid in a green economy, and increased awareness, resulting in further use of the park, and potentially increased ability to justify fundraising and investment for overall community benefit. There are many different examples of virtuous cycles, but in this instance the example we believe could be demonstrated is outlined in Figure 8 overleaf.

*Figure 8; Silverdale Country Park Societal Benefits; Virtuous Cycle Example*

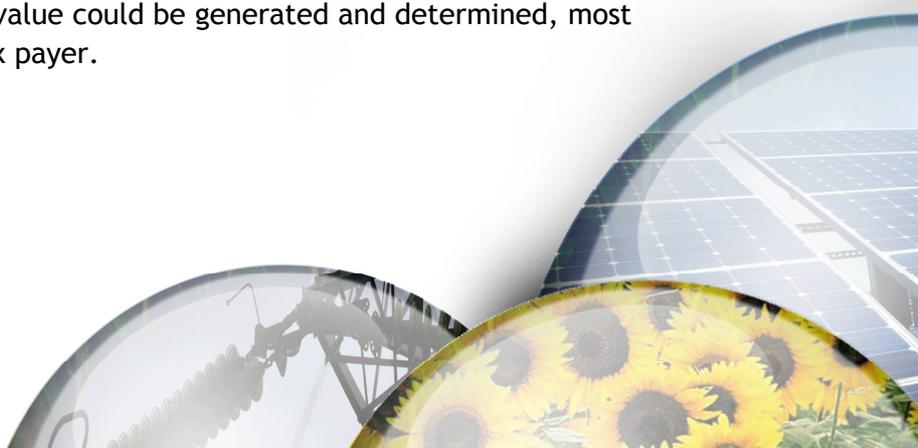


Overall, there is wider value to be included in this sort of economic analysis, in order to understand a more accurate figure.

Therefore the figure could be much greater than the >£1 million currently calculated, especially if data was gathered to include and take into consideration the following;

- ❖ Health benefits of volunteers, especially those who may be older, therefore reducing economic impacts of mental illness and health issues associated with cardiac and respiratory issues;
- ❖ Crime and antisocial behaviour value associated with the number of youth offenders who have undertaken community service at the Park and the impact of this beyond the community service i.e. reoffending and drug use reduction rates etc;
- ❖ Wider understanding of tertiary education use at the site, beyond the high level discussions that have taken place, and the impact of the research undertaken.

Furthermore, if the Land Trust were to make strategic partnerships with local health trusts or health and social related charities and organisations, especially on issues specific to the local area, further economic value could be generated and determined, most likely with a wider benefit to the tax payer.



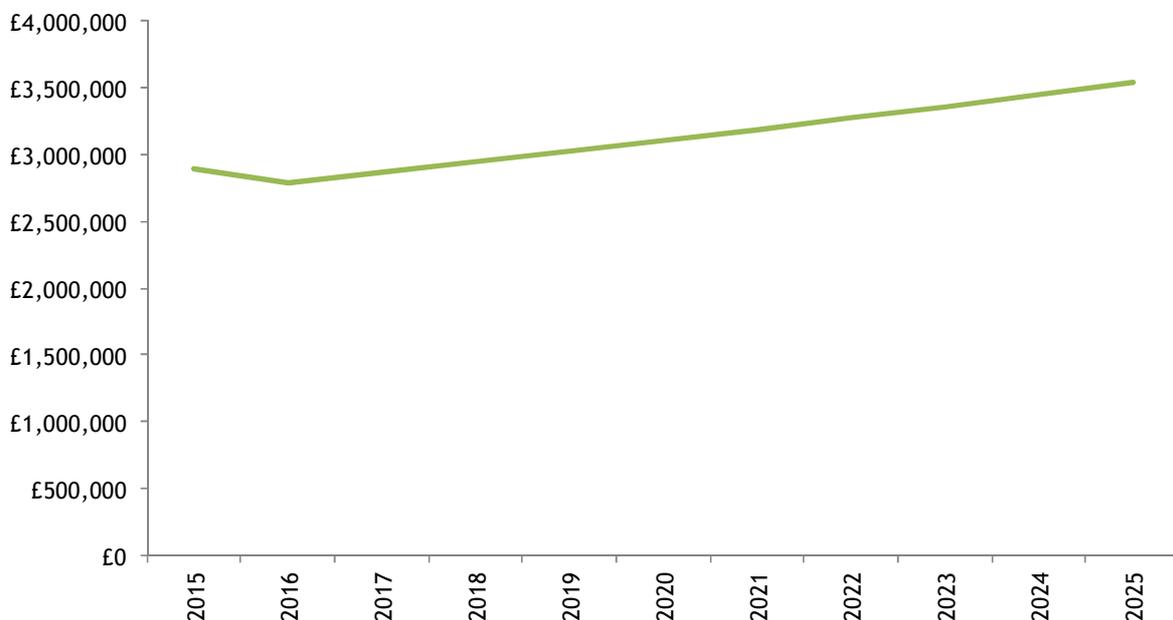
## Conclusions

Overall the current value of natural capital, based on the stocks and flows of Silverdale Country Park is calculated at £2.6 million in terms of net present value. A full copy of the natural capital account is available in Appendix A.

By 2025 the expected value of the site, taking into consideration increased rainfall and the Park’s ability to deal with this the value is thought to be £3.5 million, without any changes in management or investment into the site, or changes to current habitat area, distinctiveness or condition. Obviously should the distinctiveness and condition of habitat increase further, so too would the provision of ecosystem services.

The current projected value to 2025 is demonstrated in Figure 9 below.

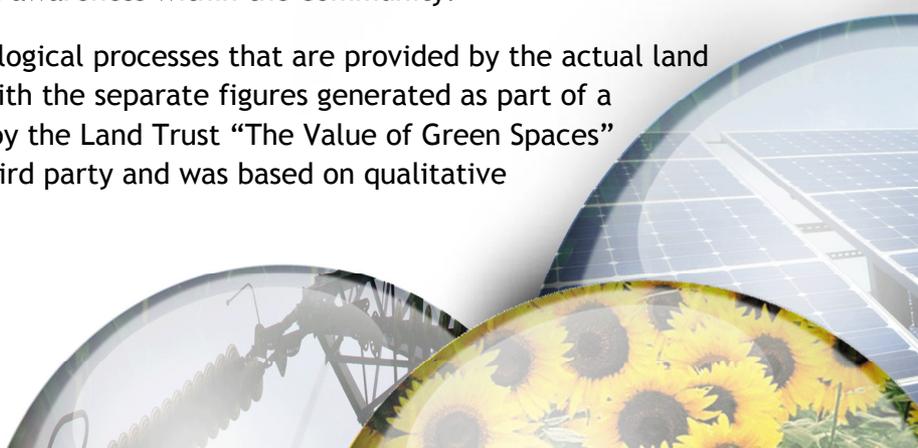
*Figure 9; Future Economic Impact of Ecosystem Service provided by Silverdale Country Park*



The drop between 2015 and 2016 is due to the discount of the stored carbon value. In terms of a wider ROI, using investment data provided by the Land Trust the current ROI is £35 for every £1 invested by the Land Trust in wider environmental value linked to the local economy and community benefit, based on NPV calculations.

It is thought that there has been an increase in the value of ecosystem services provided by Park of approximately 68% based on the perceived increase in biodiversity value since before the Park’s management by the Land Trust, and the introduction of Heritage Park, increasing the Park’s use and overall awareness within the community.

This value is based on the actual biological processes that are provided by the actual land itself, and should not be confused with the separate figures generated as part of a separate piece of work undertaken by the Land Trust “The Value of Green Spaces” which was undertaken by another third party and was based on qualitative



social data.

The figures generated as part of the work undertaken by Interserve support the work previously undertaken, and add another layer of robustness to these values, and add another lens to view the value of green space.

Overall it can be said that the existence and management of the Park in its current state has a wider environmental benefit, which will have wider economic implications to the local community, and local health and education and economic systems.

Further to this very high level hedonic analysis has been completed and it's thought that the overall environmental and social value of the Park could add up to 6% to the price of houses within the housing estate, compared to the rest of the Silverdale area, a potential extra £2.1 million revenue for the housing developers, although it's proposed that the Land Trust should review this in more detail if interested in this point, in order to apply the most accurate figures. Figures for this high level analysis take into consideration average house prices for the area, sold house prices, plus wider economic benefits as discussed within this document.

By undertaking this sort of valuation and analysis the Land Trust stands to benefit from the following by communicating the outcomes of such analysis;

- ❖ Enhanced reputation through meeting charitable aims;
- ❖ Take a leadership stance with regards to natural capital valuation and reporting and differentiate the Trust further;
- ❖ Strengthen the good news and storytelling of the Trust and;
- ❖ Attract more and differentiated investment and fundraising.

Further to this, by undertaking this sort of analysis and through publication of results, there is increased alignment with the business aims of the Trust, this is outlined overleaf in Figure 10.

Figure 10; Natural Capital Valuation alignment with Business Aspirations

## New Business Development

- Screening mechanism for development and acquisition of sites
- Supports management around ensuring financial, environmental and reputational risk - by increasing understanding of risk portfolio around environmental aspects of land banks
- Targeted approach to land acquisition and potential access to new investment models.

## Portfolio Management

- Strengthens the portfolio through the screening process, enabling delivery of appropriate environmental quality;
- Aids decision making quality with respect to development of resources available and aids understanding on value for money, including the ability to make precise decisions around new land bank opportunities such as urban development;
- Focussed approach to managed resources, enhancing charitable outcomes and benefits to communities.

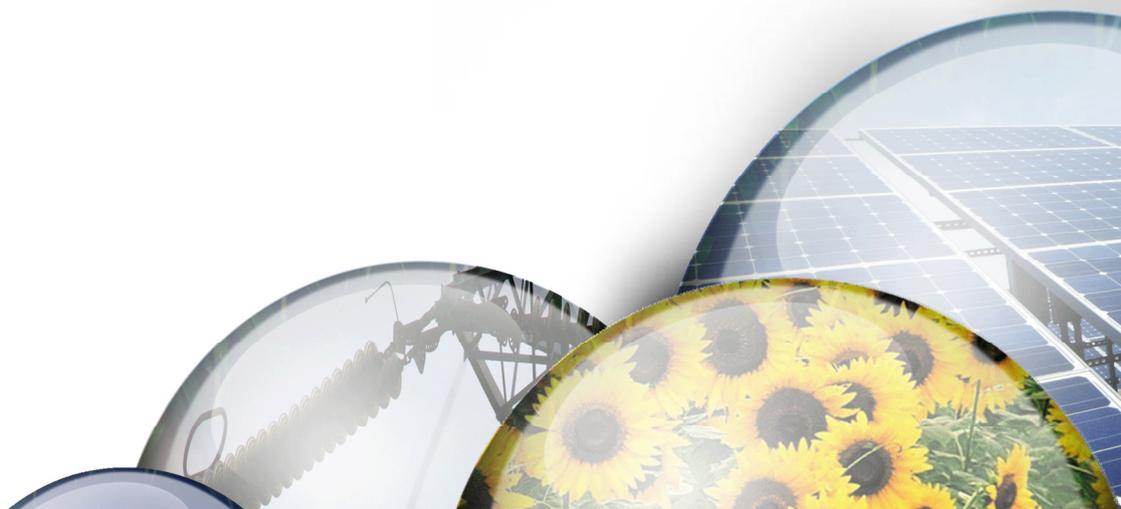
## Fundraising

- Ability to demonstrate the true co-benefits of projects which enhance the ability to attract funding in turn enabling the trust to deliver higher endowment income values;
- Ability to make more informed decisions around restorative aspects of the site;
- Give a stronger business case for creating opportunities around staff posts and a core differentiator when trying to attract new partners.

## New Initiatives

- Enhances the ability influence key strategic outcomes from which the Trust wish to extract from a proposed land development by enabling new policies to be developed around natural capital co-benefits, through being able to rank investment opportunities;
- Supports research to understand the co-benefits of identified green spaces;
- Helps better understanding of the co-benefits of the project and health and well-being outcomes, which in turn develops the Trusts capability to develop more strategic targeted health intervention programmes;
- Ability to promote and sell a community trust offering to a higher level.



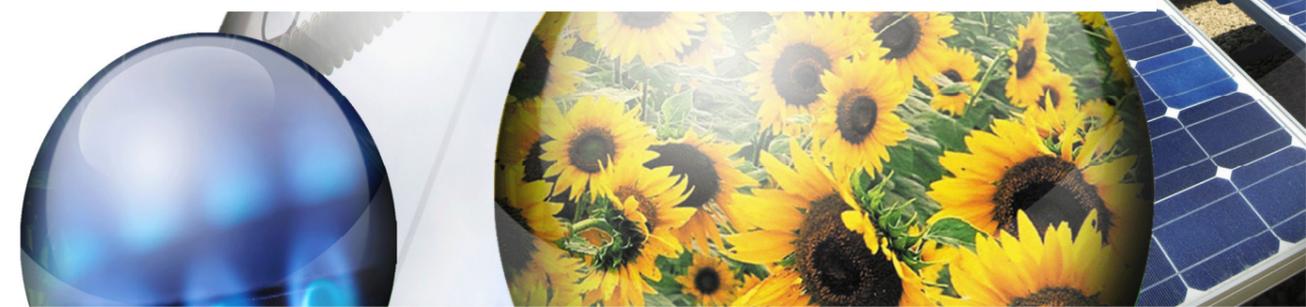


## Appendix A - Natural Capital Account for Silverdale Country Park

The Land Trust Natural Capital Account

Physical Account

Ecosystem Service	Previous Account (2011)		Current Account		Value in 2025	
	Description	Quantified Benefit	Description	Quantified Benefit	Description	Quantified Benefit
<b>Freshwater</b>	Amount of water captured within the site boundary which does not go to surface or ground drainage and is contained within the site boundary	1911.04 m <sup>3</sup>	Amount of water captured within the site boundary which does not go to surface or ground drainage and is contained within the site boundary	5972 m <sup>3</sup>	Amount of water captured within the site boundary which does not go to surface or ground drainage and is contained within the site boundary	6330 m <sup>3</sup>
<b>Air Quality</b>	The ability of the site to absorb or negate the impacts of local air quality relating to key air pollutants of importance due to both their environmental and health impacts	72.6336 kgs	The ability of the site to absorb or negate the impacts of local air quality relating to key air pollutants of importance due to both their environmental and health impacts	226.98 kgs	The ability of the site to absorb or negate the impacts of local air quality relating to key air pollutants of importance due to both their environmental and health impacts	306.423 kgs
	Woodland Area	55.7792 kgs	Woodland Area	174.31 kgs	Woodland Area	233.5754 kgs
	Grassland Area	15.1392 kgs	Grassland Area	47.31 kgs	Grassland Area	63.3954 kgs
	Wildflower meadows and conservation Grassland	1.7152 kgs	Wildflower meadows and conservation Grassland	5.36 kgs	Wildflower meadows and conservation Grassland	7.1824 kgs
<b>Climate</b>	Carbon Sequestration Carbon sequestration by soil resulting in reduced GHG Emissions	1430.4 tCO <sub>2</sub> e	Carbon Sequestration Carbon sequestration by soil resulting in reduced GHG Emissions	4470 tCO <sub>2</sub> e	Carbon Sequestration Carbon sequestration by soil resulting in reduced GHG Emissions	5721.6 tCO <sub>2</sub> e
	Carbon contained within Vegetation	354.24 tCO <sub>2</sub> e	Carbon contained within Vegetation	1107 tCO <sub>2</sub> e		1416.96
	Albedo Temperature change due to change in land cover	-0.256 oC	Albedo Temperature change due to change in land cover	-0.8 oC	Albedo Temperature change due to change in land cover	-2 oC
<b>Water</b>	Water Retention Water retained in natural water cycle due to increased ability of the site to cycle and retain water due to enhanced biological processes	1632 m <sup>3</sup>	Water Retention Water retained in natural water cycle due to increased ability of the site to cycle and retain water due to enhanced biological processes	2400 m <sup>3</sup>	Water Retention Water retained in natural water cycle due to increased ability of the site to cycle and retain water due to enhanced biological processes	2520 m <sup>3</sup>
	Water Treatment Ability or inability of the site to naturally process water due to the vegetation and habitat present on site	3019.88 m <sup>3</sup>	Water Treatment Ability or inability of the site to naturally process water due to the vegetation and habitat present on site	4441 m <sup>3</sup>	Water Treatment Ability or inability of the site to naturally process water due to the vegetation and habitat present on site	4701 m <sup>3</sup>
	Run off Increase or decrease in runoff due to quality and management of soil, and the vegetation and habitat type present on site	323.52 m <sup>3</sup>	Run off Increase or decrease in runoff due to quality and management of soil, and the vegetation and habitat type present on site	1011 m <sup>3</sup>	Run off Increase or decrease in runoff due to quality and management of soil, and the vegetation and habitat type present on site	1061.55 m <sup>3</sup>
<b>Education</b>	Number of individuals with access to the site for educational purposes	271 visits	Number of individuals with access to the site for educational purposes	447 visits	Number of individuals with access to the site for educational purposes	Unknown visits
<b>Health and Wellbeing</b>	Number of households with direct health and well being impacts	3477 households	Number of households with direct health and well being impacts	3778 households	Number of households with direct health and well being impacts	Unknown households
<b>Nutrient Cycling</b>	Nitrogen (N) Total quantity of N cycled within the site area based on plant coverage, structure and soil properties.	160 t	Nitrogen (N) Total quantity of N cycled within the site area based on plant coverage, structure and soil properties.	480 t	Nitrogen (N) Total quantity of N cycled within the site area based on plant coverage, structure and soil properties.	480 t
	Phosphorus (P) Total quantity of P cycled within the site area based on plant coverage, structure and soil properties.	160 t	Phosphorus (P) Total quantity of P cycled within the site area based on plant coverage, structure and soil properties.	480 t	Phosphorus (P) Total quantity of P cycled within the site area based on plant coverage, structure and soil properties.	480 t
	Organic Matter	3 t	Organic Matter	150 t	Organic Matter	150 t



The Land Trust Natural Capital Account

Monetary Account

0		Current Account		Value in 2025		
Ecosystem Service	Description	Quantified Benefit	Description	Quantified Benefit	Description	Quantified Benefit
Freshwater	Amount of water captured within the site boundary which does not go to surface or ground drainage and is contained within the site boundary	£49,236	Amount of water captured within the site boundary which does not go to surface or ground drainage and is contained within the site boundary	£82,061	Amount of water captured within the site boundary which does not go to surface or ground drainage and is contained within the site boundary	£102,483
Air Quality	The ability of the site to absorb or negate the impacts of local airquality relating to key air pollutants of importance due to both their environmental and health impacts	£134	The ability of the site to absorb or negate the impacts of local airquality relating to key air pollutants of importance due to both their environmental and health impacts	£419	The ability of the site to absorb or negate the impacts of local airquality relating to key air pollutants of importance due to both their environmental and health impacts	£562
		£0	Woodland			
		£0	Grassland			
Climate and Carbon	Carbon Sequestration Carbon sequestration by soil resulting in reduced GHG Emissions	£269,328	Carbon Sequestration Carbon sequestration by soil resulting in reduced GHG Emissions	£841,650	Carbon Sequestration Carbon sequestration by soil resulting in reduced GHG Emissions	£982,221
	Carbon Stored	Unable to currently Value	Carbon Stored		Carbon Stored	Unable to currently Value
	Albedo Increase in temperature due to change between bare soil and crops. Results in slight temperature differential, which increases productivity and increases CO2e absorption	Unable to currently Value	Albedo Increase in temperature due to change between bare soil and crops. Results in slight temperature differential, which increases productivity and increases CO2e absorption	Unable to currently Value	Albedo Increase in temperature due to change between bare soil and crops. Results in slight temperature differential, which increases productivity and increases CO2e absorption	Unable to currently Value
	Contribution of wetland to carbon regulation	£1,105	Contribution of wetland to carbon regulation	£3,455	Contribution of wetland to carbon regulation	£3,466
Water	Water Retention Water retained in natural water cycle due to increased ability of the site to cycle and retain water due to enhanced biological processes	£3,400	Water Retention Water retained in natural water cycle due to increased ability of the site to cycle and retain water due to enhanced biological processes	£10,624	Water Retention Water retained in natural water cycle due to increased ability of the site to cycle and retain water due to enhanced biological processes	£13,728
	Water Treatment Ability or inability of the site to naturally process water due to the vegetation and habitat present on site	£0	Water Treatment Ability or inability of the site to naturally process water due to the vegetation and habitat present on site		Water Treatment Ability or inability of the site to naturally process water due to the vegetation and habitat present on site	£25,404
	Run off Increase or decrease in runoff due quality and management of soil, and the vegetation and habitat type present on site	-£6,113	Run off Increase or decrease in runoff due quality and management of soil, and the vegetation and habitat type present on site	-£4,631	Run off Increase or decrease in runoff due quality and management of soil, and the vegetation and habitat type present on site	-£5,784
	Contribution of wetland to water purification and cycling	£116	Contribution of wetland to water purification and cycling	£361	Contribution of wetland to water purification and cycling	£379
	Contribution of the lake to water storage and flood regulation	£228,509	Contribution of the lake to water storage and flood regulation	£380,849	Contribution of the lake to water storage and flood regulation	£431,859
Education	Value of increased or reduced hazards such as flood, subsidence, erosion, contamination etc due to the current land and habitat and their management	£175,607	Value of increased or reduced hazards such as flood, subsidence, erosion, contamination etc due to the current land and habitat and their management	£698,993	Value of increased or reduced hazards such as flood, subsidence, erosion, contamination etc due to the current land and habitat and their management	£998,486
Health and Well-being	Ability of the site to provide health and well-being benefits to the local community offsetting local health costs and wider GVA value to the local economy	£121,872	Ability of the site to provide health and well-being benefits to the local community offsetting local health costs and wider GVA value to the local economy	£380,849	Ability of the site to provide health and well-being benefits to the local community offsetting local health costs and wider GVA value to the local economy	£598,880
Nutrient Cycling	Nitrogen (N) Total quantity of N cycled within the site area based on plant coverage, structure and soil properties.	-£176,960	Nitrogen (N) Total quantity of N cycled within the site area based on plant coverage, structure and soil properties.	£233,563	Nitrogen (N) Total quantity of N cycled within the site area based on plant coverage, structure and soil properties.	£393,279
	Phosphorus (P) Total quantity of P cycled within the site area based on plant coverage, structure and soil properties.	-£22,630	Phosphorus (P) Total quantity of P cycled within the site area based on plant coverage, structure and soil properties.			
Total Value (NPV)		£643,604		£2,628,191		£3,939,930
Net Value (NPV)				£1,984,588		



