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Appendix A - Business Case for Bedford & Milton Keynes Waterway

Natural Capital Appraisal

B&MK Trust

Delivering a better world

Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
V1	31 March 2025	Draft	HD	Helen Dunn	Technical Director
V2	08 May 2025	Draft	HD	Helen Dunn	Technical Director

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1. Introduction

1.1 Context and purpose

This appendix chapter sets out the scope, methodology and preliminary results of the natural capital assessment for the proposed Bedford and Milton Keynes Waterway. To provide additional background on the results of the natural capital assessment, this chapter includes a materiality assessment and valuation methodologies of the ecosystem services included within the scope of the assessment.

The work on natural capital net benefits is part of a wider project, in which AECOM has been commissioned to develop an Outline Business Case (OBC) for the proposed Bedford & Milton Keynes Waterway (B&MKW) with the results from the natural capital assessment feeding into the economic case.

Building in the natural capital benefits of the scheme aligns strongly with the Trust's aims to contribute to nature recovery and the importance of integrating the natural capital benefits of the proposed waterway into the overall business case. A high-level Biodiversity Net Gain strategy has been created by Lichfields[12] in line with the statutory Biodiversity Net Gain legislated in the Environment Act (2021) which came into force in February 2024. This work on developing an understanding of the biodiversity impacted by the waterway will inform this natural capital assessment.

The proposed approach to natural capital appraisal follows HM Treasury Green Book[2] and Defra Enabling a Natural Capital Approach (ENCA)[1] guidance to provide both physical flow and monetary flow estimates for the waterway option(s) as compared to the baseline or 'do nothing' scenario.

1.2 Rationale and uses of an assessment

Natural capital refers to the stocks of elements of nature that have value to society such as forests, fisheries, rivers, and land. Natural capital stocks provide flows known as ecosystem services over time which provide a wide range of benefits. Example ecosystem services include pollination, climate regulation, water quality regulation, recreation, and biodiversity.

By including natural capital values in the Outline Business Case (OBC), B&MK Trust can help to ensure that the economic case for the B&MK Waterway accounts for the full range of environmental, social, and economic impacts. Natural capital valuation can highlight the importance of critical ecosystem services, such as the provision of carbon sequestration, flood regulation, and biodiversity.

1.3 Background

The proposed Bedford Milton Keynes Waterway (B&MKW) is a new 26 km canal connecting the Grand Union Canal at Campbell Park in Milton Keynes to the head of navigation of the River Great Ouse at Kempston, west of Bedford. The project is being led by the Bedford and Milton Keynes Waterway Trust (B&MKT) and through the B&MKW Consortium comprising: Bedford Borough Council; Bedford & Milton Keynes Waterway Trust; Canal and River Trust; Central Bedfordshire Council; Environment Agency; Forest of Marston Vale Trust; Milton Keynes Council; South East Midlands Local Enterprise Partnership (SEMLEP) and The Parks Trust.

The Waterway will provide a 'missing link' between the UK canal network and the Fenland Waterways as well as forming a green corridor between Bedford and Milton Keynes. The new waterway is currently secured in three local plans and with planning permission achieved on sections of the waterway, it aims to provide benefits locally and regionally.

Previous work explored the potential economic benefits of the B&MK Waterway. However, there is recognition that the economic case needs to more fully integrate natural capital benefits which is the scope of this part of the wider project.

[1] Defra: Enabling a Natural Capital Approach guidance (ENCA), updated 2025

2. Guidance

2.1 HM Treasury Green Book

The HM Treasury's **Green Book** provides guidance on how to appraise policies, projects, and programmes in the UK, including the environment. The Green Book and 5-Case Business Case guidance (which includes the Economic Case) emphasises the cost-benefit analysis framework for understanding value for money when considering new infrastructure, including the potential costs and benefits from environmental impacts and ecosystem services. The Green Book recommends natural capital as a lens for improved consideration of impacts on the environment (see 1).

Figure 1: Natural Capital Framework (HM Treasury Green Book)[2]

The integration of **natural capital** into the economic appraisal allows for the inclusion of the broader benefits that ecosystems provide. For example, design of the Waterway could see it acting as a flood control mechanism in the area, safeguarding economic development by reducing damage to life and property and the disruption that accompanies flooding.

2.2 Enabling a Natural Capital Approach

Enabling a Natural Capital Approach (ENCA)[1] is supplementary guidance to HM Treasury's Green Book provided by the Department for Environment, Food & Rural Affairs (Defra) to enable organisations to undertake natural capital assessments. Guidance is provided on natural capital frameworks and methods for economic valuation of environmental impacts, enabling the incorporation of natural capital in a project appraisal.

ENCA represents the latest guidance from the UK Government on the best practice approach to natural capital. As such, it is an important source of data for reference in the project. ENCA provides impact pathways and valuation sources for a range of ecosystem services which are used in the assessment.

3. Approach

3.1 Methodology

As set out above, the methodology used to assess the environmental and natural capital benefits in this appraisal aligns with HM Treasury's Green Book and Defra's ENCA guidance. The ENCA

[2] HM Treasury (2022): The Green Book

framework and recommended approaches provide a foundation for quantifying and valuing ecosystem services, ensuring a robust appraisal of the natural capital benefits associated with the proposed scheme. Note, that it will be important to consider if there are any natural capital disbenefits alongside core benefits, for example where existing natural assets are lost due to the creation of the waterway. In the context of this project, the focus of the natural capital assessment will be on the proposed waterway, compared to a baseline 'do nothing' scenario. To do this, the following is undertaken:

3.1.1 Scoping and Materiality Assessment

A detailed mapping of the proposed scheme option(s) compared to the baseline 'do nothing' has been undertaken to evaluate the potential natural capital impacts and net benefits. Using an ecosystem services framework, the assessment identifies material services of importance to inform the prioritisation of key natural capital impacts for quantification and valuation.

3.1.2 Valuation Approach and Data Requirements

For the prioritised ecosystem services, logic chains have been developed to outline the approach to quantification and valuation. This involves comparing the proposed scheme to a 'do nothing' scenario to measure additional benefits or disbenefits. The approach for each service provides details on:

- Quantification and valuation methodology
- Data requirements and sources (e.g., data inputs from B&MKW Consortium and wider evidence sources including ENCA[1], Office for National Statistics, and previous studies such as Canal & River Trust's *Value of Waterways*)
- Key assumptions

3.1.3 Appraisal of Natural Capital Benefits

The appraisal of the key natural capital impacts follows the principles of the economic case, including applying consistent parameters such as appraisal time period and base year. The analysis provides annual and present value calculations of the benefits to be integrated into the economic appraisal. Care is taken to ensure there is no double-counting with other benefits in the economic case and sensitivity analysis is undertaken to test any key assumptions.

3.2 Scope

3.2.1 Spatial Scope

The spatial scope of this appraisal includes the 26km waterway, as outlined in Figure 2. Hence, the assessment scenario includes approximately 49.2 hectares of new waterway and 10.4 hectares of modified grassland (which represents the 2m grass margin which runs along each side of the waterway). The baseline scenario includes the original land cover before the proposed intervention.

To obtain land cover data, a GIS shapefile was drawn, based on the Waterway Route Centreline available on the Bedford & Milton Keynes Waterway website (2024)[3], these values were then translated into the UKCEH Land Cover Map habitat types. This data is available for both the baseline and proposed waterway scenarios in Table 1 and Table 2. Since this shapefile was modelled by visually translating the Waterway Route Centreline storymap[3] into GIS, it is likely that the land cover types are subject to inaccuracies and also would require revisiting as the specifics of the Waterway route are further refined. Currently, our GIS shapefile overlaps with 11.67 hectares of surrounding lake habitats. However, a justifiable assumption is that whilst the BMK Waterway route is intended to feed into and link to nearby lakes, it is not expected to overlap in terms of the boundary. Therefore, the lake area has been excluded from the analysis to improve the accuracy of our results.

Additionally, due to the limited data available, certain features have not been included within this spatial scope, such as the natural planting[4] expected to run along the sides of the rural canal bank. The final

[3] BMKW (2024): Bedford & Milton Keynes Waterway Storymap
[4] Further assumptions on location of natural planting could then ensure these aspects are included in the natural capital assessment. In particular, if it was assumed the natural planting run alongside the length of the Waterway, it could imply loss of higher value habitats which in reality would not be expected.

natural capital values would be expected to differ if these features were to be included in future assessments.

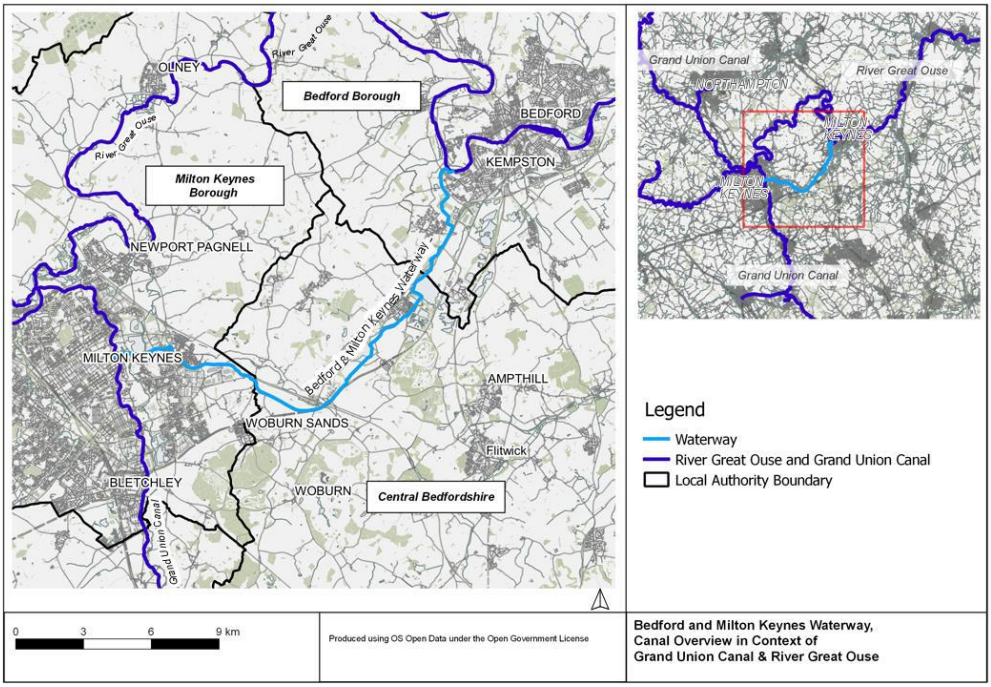

Figure 2: Map of the proposed waterway
Source: Peter Brett (2018): Bedford & Milton Keynes Waterway Economic Analysis

The asset registers for the baseline and the new Waterway can be used to define the ecosystems services in scope for the natural capital assessment, see next section. This reflects the habitats within the red line boundary but does not include areas that may be additional to meet mandatory 10% BNG. For further discussion of meeting 10% BNG and the implications for the natural capital assessment, see 6.2.3.

Table 1: Asset Register - Baseline

UKCEH LCM broad Habitat type	Quantity (ha)	% of total area
Broadleaved Woodland	3.38	5.67%
Coniferous Woodland	0.01	0.02%
Arable and Horticulture	14.31	24.01%
Improved Grassland	24.26	40.70%
Neutral Grassland	2.73	4.58%
Freshwater	11.67	19.58%
Urban	1.05	1.76%
Suburban	2.20	3.69%

Table 2: Asset Register - Proposed Waterway

UKCEH LCM broad Habitat type	Quantity (ha)	% of total area
Broadleaved Woodland	0.00	0.00%
Coniferous Woodland	0.00	0.00%
Arable and Horticulture	0.00	0.00%
Improved Grassland	10.40	17.45%
Neutral Grassland	0.00	0.00%
Freshwater	49.21	82.55%
Urban	0.00	0.00%
Suburban	0.00	0.00%

3.2.2 Temporal Scope

The price year is the year to which all monetary values are standardised when calculating the value of natural capital benefits (so that all values are reported in real terms). To be consistent with the Economic Case, a price base year of 2025 has been applied; all values are adjusted using the CPIH index and OBR economic and fiscal outlook estimations[5] to reflect their equivalent in 2025.

The natural capital benefits of the proposed waterway are estimated in present value terms, comparing the total benefits of the new waterway to a 'do nothing' scenario. The assessment applies HM Treasury Green Book discount rates. Given the scale and lasting effects of the intervention, a 60-year appraisal period (2036–2096) has been selected. This timeframe reflects the construction phase, the gradual realization of benefits, and the long-term contribution of the waterway to natural capital and ecosystem services. The discount year 0 is chosen to be 2025 for both costs and benefits.

3.3 Literature

The valuation of natural capital benefits in this report has been guided by a range of key studies and assessments that examine the economic, environmental, and social value of waterways for the proposed Bedford and Milton Keynes Waterway. These reports provide background context, and data that have been utilised in our analysis. Key sources informing this valuation include:

- **Bedford & Milton Keynes Waterway Economic Impact Assessment, SQW Consulting (September 2009)[6]:** This study assesses the potential economic impacts that could arise from the construction and operation of the Waterway. The economic benefits considered in this report include: recreation, green infrastructure, regeneration & property, ecosystem services, transport, place shaping and tourism.
- **Bedford Waterspace: Economic Impact & Opportunities Study, Richard Glen Associates (August 2011)[7]:** This report studies the Bedford section of the River Great Ouse and draws out the economic impacts and opportunities of river-related projects which will help stimulate long-term regeneration in the river corridor; this includes water-based activities, recreation, hydropower and property uplift.
- **Bedford & Milton Keynes Waterway Project Delivery Plan, Bedford & Milton Keynes Waterway Consortium (November 2014)[8]:** This report provides an overview of the proposed waterway (split into 26 sections labelled A-Z). It provides an update on where progress has been made (up to 2014) and notes the next steps and funding statuses for each section.
- **Bedford & Milton Keynes Waterway, Economic Analysis, Peter Brett (May 2018)[9]:** This report is the latest economic analysis report and provides key information on the planned development and engineering works and monetised tourism, construction, residential and commercial impacts.
- **Bedford and Milton Keynes Waterway Park, Water Resources Management Study Phase 2, Stantec (January 2023)[10]:** Phase 2 of this study expands on the previous Phase 1 study. Both provide detail on water trading opportunities as well as environmental considerations, particularly Invasive Non-Native Species (INNS), to be considered for the waterways project.
- **Valuing our Waterways Aggregate Benefits to Society and the Economy Technical Report, Canal and River Trust (March 2024)[11]:** This report assesses the economic, social, and environmental benefits of the UK's waterways, highlighting that canals contribute £1.5 billion annually to the economy and contribute £4.6 billion in social value, including £1.1 billion in NHS savings from health benefits. The purpose of this report is to demonstrate the importance of continued investment in canal infrastructure to sustain these benefits for communities,

[5] Office for Budget Responsibility (OBR) (2024): Economic and Fiscal Outlook 2024
[6] SQW Consulting (2009): Bedford & Milton Keynes Waterway Economic Impact Assessment
[7] Richard Glen Associates (2011): Bedford Waterspace: Economic Impact & Opportunities Study
[8] Bedford & Milton Keynes Waterway Consortium (2014): Bedford & Milton Keynes Waterway Project Delivery Plan
[9] Peter Brett (2018): Bedford & Milton Keynes Waterway, Economic Analysis
[10] Stantec (2023): Bedford and Milton Keynes Waterway Park, Water Resources Management Study Phase 2
[11] Canal and River Trust (2024): Valuing our Waterways Aggregate Benefits to Society and the Economy Technical Report

businesses, and the environment. It provides a useful evidence source for valuing the natural capital benefits of canals.

- **Bedford to Milton Keynes Waterway Biodiversity Net Gain Strategy, Lichfields (June 2024)[12]:** This is a high-level strategy developed by Lichfields which summarises the implications of BNG for the BMK Waterway, both in terms of requirements and opportunities for BNG.
- **Bedford and Milton Keynes Waterway Park Flood Risk Management Opportunity Study Phase 2, Stantec (September 2023)[20]:** Study understanding the existing flood risk constraints along the waterway and providing a comprehensive technical appraisal of the feasibility of strategic and local scale flood management solutions (first identified in the Phase 1 report)

4. Materiality Assessment

4.1 Materiality Assessment

The specific objective of this assessment is to evaluate the natural capital impacts of the proposed waterway compared to a “do-nothing” baseline scenario. This assessment is based on a 60-year period.

In order to determine the relevant material impacts to be included within the natural capital assessment, a qualitative materiality assessment is required. The impacts of the new Waterway compared to the baseline (or ‘do nothing’ scenario) are assessed against a long list of ecosystem services set out below. This identifies the significance or materiality of impact based on the below criteria:

- ↑↑ = significant positive impact
- ↑ = minor positive impact
- → = no or overall neutral impact
- ↓ = minor negative impact
- ↓↓ = significant negative impact
- ↑/↓ = both positive and negative impacts
- **TBC** = further evidence is required to assess this impact

In addition to the literature identified above, in order to complete the materiality assessment, the mapping of the natural assets of the area for the proposed waterways compared to the baseline provides a key input into this assessment.

Based on this assessment, the materiality of the potential impacts was then be categorised as:

- **High** = high impact and likely to be of importance to Bedford and Milton Keynes Waterway Trust or to wider society
- **Medium** = medium impact and potential to be of some importance
- **Low** = low impact and unlikely to be of importance
- **TBC** = further evidence is required to assess this impact

A threshold has been set above which impacts are considered material to the assessment. Impacts assessed as having ‘high’ or ‘medium’ materiality will be considered above the threshold and as a priority for inclusion in the assessment. The table below sets out the long list of ecosystem services and the results of the materiality assessment; the assessment resulted in ten of the ecosystem services being deemed material for the assessment, these are listed below. However, to reduce

[12] Lichfields (June 2024): Bedford to Milton Keynes Waterway Biodiversity Net Gain Strategy

overlap with the wider OBC, visual & amenity and tourism services have not been included in the scope of the natural capital assessment as these have been quantified separately.

- Crops
- Livestock
- Water Supply
- Global Climate Regulation
- Air Pollution Removal
- Flood Regulation
- Recreation
- *Tourism **
- *Visual and amenity **
- Biodiversity

(*) Material impacts but covered separately so not included in the natural capital assessment to avoid double-counting.

Table 3: Scoping and Materiality Assessment

Ecosystem service	Definition	Baseline	BMK Waterway	Justification	Materiality
Crops	A raw material that is grown or harvested and processed by humans (e.g., wheat etc.) for food or other uses	→	↓	The proposed waterway covers approximately 14.3 hectares of enclosed farmland, so there would be a loss of agricultural provisioning service due to the creation of the new waterway	Medium
Livestock	An animal that is grown, harvested and processed by humans for food or other uses (e.g., meat, wool, leather etc.)	→	↓	The proposed waterway covers approximately 14.3 hectares of enclosed farmland, so some farm profit will likely be lost due to the construction of the waterway	Medium
Fisheries	Commercial processing of freshwater or marine wildlife for human consumption e.g., fish and shellfish	→	→	No significant use or supply for proposed waterway option	Low
Aquaculture	The cultivation of freshwater and saltwater fauna and flora under controlled conditions	→	→	No significant use or supply for proposed waterway option	Low
Wild foods	Wild plants and animals that are consumed by communities; including plants, fruits, nuts, animal meats and fish	→	→	No significant use or supply for proposed waterway option	Low
Timber	Growth, harvesting and sawing of trees for use in furniture, building materials, fuel and paper	→	→	No timber production in the Bedford Ouse area	Low
Energy (renewables)	Sources of renewable energy	→	→	The RGA report (2011)[7] notes the potential for developing small-scale hydropower schemes at the weirs and locks, however, this has not been expanded on in later studies. No significant use or supply for proposed waterway option.	Low
Biochemicals and medicines	Compound or material manufactured for use as medicinal drugs	→	→	No significant use or supply for proposed waterway option	Low
Water supply	The regulation of the provision of freshwater	→	↑↑	Waterway is expected to transfer water to potential customers along the route of the Waterway and then onward on the River Great Ouse (RGO) downstream of Bedford.	High

Fibres and ornamental resources	Materials such as wood, cotton, hemp, silk wool and animal and plant products, such as skins, shells and flowers are used as ornaments and whole plants are used for landscaping, materials and ornaments	→	→	No significant use or supply for proposed waterway option	**Low**
Genetic resources	This includes the genes and genetic information used for animal and plant breeding and biotechnology	→	→	No significant use or supply for proposed waterway option	**Low**
Local climate regulation	Reduction in air temperature from vegetation by greenspace and bluespace	→	↑/↓	Waterways can cool the surrounding area through evaporation, which can minimise the impact of climate change. However, the loss of area habitats to develop the waterway means that the local climate regulation benefits from the original habitats are lost.	**Low**
Global climate regulation	The process of increasing the carbon content of a carbon sink other than the atmosphere	→	↓	Global climate regulation benefits from the original habitats will be lost. Waterways may have minimal global climate regulation benefits by storing carbon from living plant tissue and decomposed vegetation in the waterbody, but there is limited literature evidencing this. However, integration of green infrastructure and natural planting in future assessments will likely mitigate or reverse the loss of these benefits.	**Medium**
Air quality regulation	The removal of air pollution by vegetation including trees which health benefits to society	→	↓	Air quality regulation benefits from the original habitats will be lost. Freshwater habitats do provide air quality regulation benefits by absorbing and reducing the concentration of particulate matter (PM) but these benefits are less than the baseline habitats (such as woodlands and grasslands)	**Medium**
Flood regulation	The regulation of flood risk as a result of soil and vegetation which slow the flow of water or store water from rain and waterbodies	→	↑↑	Waterway has the potential to provide flood regulation benefits through SuDS (sustainable drainage systems) provision as part of new development	**High**

				– this has been supported in the Peter Brett report[9]. Additionally, the Waterway can store water during flood events in connecting waterbodies, reducing the risk of flooding. The Stantec (2023) report[20] highlights the flood risk benefits gained from the water transfer between the Grand Union Canal and other waterbodies.	
Water quality regulation	The process by which contaminants such as chemicals, and biological and suspended solids are removed from waterbodies	→	↑	Plants in the waterway and ecosystems can trap, break down, process and transform pollutants, toxins and heavy metals present in water, however, there is limited literature evidencing this. However, the Lichfields BNG report[12] mentions the option for wetland creation in the proposed waterway plan, which could have significant water quality regulation impacts.	**Low**
Land Drainage	The process of draining excess water from surrounding land and reducing the downstream cost of treatment to water companies.	→	↑	Canals can provide land drainage benefits, however, the current proposal focuses on the potential to transfer water from Minworth wastewater treatment works (WwTW) to the Affinity Water supply area[10], as opposed to the reverse.	**Low**
Pollination	In the context of ecosystem services, pollination generally refers to animal-assisted pollination which enables fertilisation, such as that done by bees, rather than wind pollination	→	↑/↓	Pollination benefits from the original habitats lost (e.g. semi-natural grassland), however, these benefits are minimal due to the small area of enclosed farmland. If the proposed waterway considers developing floodplain meadows as part of the plan, there could be potential pollination benefits.	**Low**
Disease & pest control	The natural control of diseases and pests by predatory species	→	↑/↓	No significant use or supply for proposed waterway option	**Low**

Noise regulation	Noise pollution is associated with adverse health outcome through lack of sleep and disturbance. This can be mitigated by vegetation acting as a noise buffer	→	↑/↓	Canals may reduce noise pollution by incentivising reduced car use, however, the original habitats could have provided noise regulation benefits by absorbing, scattering or reflecting noise. Both these impacts would be minimal.	**Low**
Soil quality regulation	The process by which soils capture and release carbon, nutrients and water, detoxify pollutants, purify water, and suppress soil-dwelling pests and pathogens	→	↑/↓	No significant impact from the proposed waterway option	**Low**
Recreation	Active enjoyment of the natural environment, for example, walking, fishing/angling, and canoeing	→	↑↑	Proposed waterway will create new leisure opportunities, including walking, cycling and water-based activities.	**High**
Tourism	Visits to the site due to available attractions and activities	→	↑↑	Proposed waterway will create new leisure opportunities and attract more visitors to available attractions. The Peter Brett (2018) report[9] previously estimated there to be a £7.0m increase in annual visitor expenditure and up to £100.1m 20 years after construction.	**High**
Education and volunteering	Environmental settings of varying habitats, which inform and support educational activities and learning experiences. This includes settings and opportunities for people to engage in voluntary conservation-type activities	→	↑	Proposed waterway can create new education and volunteering opportunities, details on these opportunities should be considered in the future but are not considered to be part of the core economic case.	**Low**
Heritage	Attributes that relate to the legacy of tangible and intangible heritage assets of a group or society that is inherited from past generations	→	→	No significant use or supply for proposed waterway option since this waterway is a new development.	**Low**
Visual & amenity	Passive enjoyment of the natural environment, for example, landscape appreciation and views	→	↑	Proposed waterway creates new leisure opportunities and scenic waterways.	**Medium**
Biodiversity	The Convention on Biological Diversity (Article 2) defines biodiversity as the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part, this	→	↑/↓	Biodiversity from the original habitats will be lost, however, watercourse habitats and additional natural planting will be created as a result of the proposed development. Any identified	**High**

	includes diversity within species, between species and ecosystems			losses will be required to be offset to deliver 10% BNG.	

5. Measure and value

This section provides an overview of the approach to valuing each of the ecosystem services in Section 4 identified as material for the natural capital assessment in order to measure the benefits of the proposed waterway compared to the baseline 'do nothing' scenario. For each impact, an impact pathway table provides an outline of the approach to quantification and valuation, as well details of the data used and any key assumptions.

The impact pathway tables also indicate the robustness of the valuation approach (using a high, medium, low scoring system). The assessment of robustness is based on expert judgment and considers both the quality of the methodology for estimating the value of the service (with market price considered the most robust), and the accuracy of the data available to support the valuation.

Ecosystem Service: Food Provisioning

Activity	Change in supply of crops and livestock due to converted farmland to waterway
Impact	Decrease in crop and livestock output
Receptor	Local farmers
Physical flow data	• Pre and post-intervention habitat type and area (ha) provided using the UKCEH Land Cover Map 2023[13], using 10m raster size • Natural Environment Valuation Online (NEVO) tool[14] to estimate the proportion of land in the Bedford Ouse area used for cereal and general cropping and livestock
Monetary flow data	Farmland rent values (£/ha/annum) for the different crop types provided by Defra (2025)[15]
Confidence	**Medium**

Ecosystem Service: Water Supply

Activity	Change in supply of freshwater for water abstraction
Impact	Increase in the transfer of water for public use
Receptor	Water company customers for water abstraction
Physical flow data	• Water transfer of B&MK Canal (million m^3), provided by the Stantec (2023) water resources report[10]
Monetary flow data	Resource rent approach, unit 5-year average resource rent value (£/m^3) derived from the ONS 2024 natural capital accounts[16]
Confidence	**Medium**

Ecosystem Service: Global climate regulation

Activity	Carbon sequestration provided by habitats pre and post -intervention
Impact	Change in balance of greenhouse gases entering the global atmosphere
Receptor	Wider society
Physical flow data	• Pre and post-intervention habitat type and area (ha) provided using the UKCEH Land Cover Map 2023[17], using 10m raster size • Carbon sequestration rates per hectare of habitat (tCO2/yr)[18]
Monetary flow data	DESNZ recommended central carbon values over time, uprated to 2025 prices (£/tCO2)
Confidence	**Medium**

[13] UKCEH (2023): Land Cover Map 2023
[14] Land, Environment, Economics and Policy (LEEP) Institute at the University of Exeter (2022): Natural Environment Valuation Online tool (NEVO)
[15] Defra (2025), Farm Rents: Annual statistics about average farm rents in England 2023/24. Includes Farm Business Survey Rent Dataset
[16] ONS (2024) UK natural capital accounts: 2024
[17] UKCEH (2023): Land Cover Map 2023
[18] Natural England (2021) 'NERR094 - Edition 1: Carbon Storage and Sequestration by Habitat 2021'

Ecosystem Service: Air quality regulation

Activity	Removal of air pollution provided by habitats pre-intervention
Impact	Change in health outcomes from removing habitats which provide air pollution removal benefits
Receptor	Local population, visitors and tourists
Physical flow data	• Pre and post-intervention habitat type and area provided using the UKCEH Land Cover Map 2023[17], using 10m raster size • Removal rates of pollutants (PM2,5, SO2, NO2 and O3) per hectare of habitat (t/ha/yr)[19]
Monetary flow data	Avoided health damage costs per tonne of PM2,5, SO2, NO2 and O3 (£/t) removed from Jones et al. (2017)[19], uprated to 2025 prices
Confidence	**Medium**

Ecosystem Service: Flood regulation

Activity	Connection of Grand Union Canal to other waterbodies enabling the transfer of floodwater during flood events, and water absorption and attenuation provided by vegetation along the canal
Impact	Minimised risk of flood events and reduced likelihood of damage to local properties
Receptor	Local households / businesses / emergency services
Physical flow data	• Number of properties at reduced risk of flooding provided in Stantec - Flood Risk Management Study Phase 2 Report (2023)[20]. Data estimated using multiple datasets including OS mapping data and Environment agency flood risk estimates[21]
Monetary flow data	The avoided annual direct and indirect costs to both residential and non-residential properties from the transfer of water between GUC and other waterbodies. Estimation by Stantec[20] using the Multicoloured Manual Handbook (Priest et al. (2024)[22]
Confidence	**Medium**

Ecosystem Service: Recreation

Activity	Use of B&MK Canal and greenspaces for recreation
Impact	Wellbeing and physical health benefits for individuals using the waterway and supporting infrastructure (towpaths, greenspace etc.)
Receptor	Local population visitors
Physical flow data	• Estimated visitor data from ORVa (visits/year)l[23] • For physical health, the percentage of active visits from total visits are taken from a Defra calculation based on White et al (2016) (visits/year)[24] • Estimated visitor data for water-based activities from the Peter Brett report (visits/year)[9]
Monetary flow data	• Welfare values (£) are provided by ORVal • Physical health values derived from NHS avoided health costs (£/visit)[25] • Projected tourism spend (£) by water-based tourists taken from the Peter Brett report[9]
Confidence	**Medium**

Ecosystem Service: Biodiversity

Activity	Changes in habitat type to watercourse habitats

[19] Jones et al. (2017). Developing Estimates for the Valuation of Air Pollution Removal in Ecosystem Accounts (re-published in February 2019)
[20] Stantec (2023) - Bedford and Milton Keynes Waterway Park Flood Risk Management Opportunity Study Phase 2 Report
[21] EA Flood Map for Planning, EA Risk of Flooding from Surface Water (RoFSW). Available on Department for Environment Food & Rural Affairs (Defra) Data Services Platform
[22] Priest et al. (2024): Flood and Coastal Erosion Risk Management: 2024 Handbook for Economic Appraisal
[23] Day and Smith (2018). Outdoor Recreation Valuation (ORVal): Version 2.0, Land, Environment, Economics and Policy (LEEP) Institute, Business School, University of Exeter.
[24] White, M. et al (2016), Recreational physical activity in natural environments and implications for health: A population based cross-sectional study in England.
[25] Centre for Health Economics (2015): Estimating the NICE cost effectiveness threshold

Impact	Replacing current habitats with watercourse habitats, which incorporate a range of habitats and enable habitat connectivity
Receptor	Local and wider community
Physical flow data	• Pre and post-intervention habitat type and area provided using the UKCEH Land Cover Map 2023[17], using 10m raster size • Number of biodiversity units provided by habitats (calculated using the Statutory Biodiversity Metric)[26]
Monetary flow data	Market price estimates for different types of biodiversity units provided by Biodiversity Units UK, uprated to 2024 prices[27]. To avoid the negative implications of valuing biodiversity using market prices (e.g. not reflecting true biodiversity value and double-counting) this has been pulled out into a separate analysis and section in the results
Confidence	**Low**

[26] Defra (2023): Statutory biodiversity metric tools and guides - GOV.UK (www.gov.uk)
[27] Biodiversity Units UK (2024): The BNG Report: Pricing & Key Insights

6. Natural Capital Assessment

6.1 Results

The results of the natural capital assessment are provided in Table 4. The estimated increase in natural capital value (over the 60-year period) is over £86.8 million (2025 prices) of the proposed waterway relative to the baseline. This result is largely driven by the high value attributed to the potential water supply. If this is excluded, the assessment still shows there is a net increase in natural capital value of about £82.9 million over the 60 years. Other services such as recreation and flood regulation provide notable value. A more detailed description of each service is provided below.

It is important to be aware of what is included and excluded from the natural capital assessment. For example, the estimates for carbon and air quality focus on carbon sequestration and air pollution removal from different habitats. However, the development of the new Waterway is expected to encourage more sustainable travel which will have benefits in terms of carbon and air pollution reductions. The proposed waterway will change behaviours by enabling more cycling and walking and reducing overall car use. This reduces congestion and CO2 emissions – improving productivity, air quality, health and connectivity through walking and cycling on the of towpaths. The Canal and River Trust[11] estimates that its canals provide an annual benefit of £19m in avoided health damage costs related to reduced vehicle use. These values are captured in the Active Mode Appraisal Toolkit calculations in the Economic Case.

Table 4: Natural Capital Assessment Results: Net Present Value for period 2036-96

Ecosystem Service	Baseline (do nothing scenario)	Assessment Scenario 1	Net change Baseline to Assessment 1	Confidence Ratings
Global climate regulation	£1,059,208	£35,317	-£1,023,891	Medium
Air quality regulation	£2,792,230	£1,259,991	-£1,532,239	Medium
Flood regulation	£0	£21,924,549	£21,924,549	Medium
Water Supply	£0	£46,659,594	£46,659,594	Low
Food Provisioning	£62,162	£0	-£62,162	Low
Recreation (Low Estimate)	£0	£5,521,794	£5,521,794	Medium
Recreation (Central Estimate)	£0	£7,333,051	£7,333,051	Medium
Recreation (High Estimate)	£0	£18,560,654	£18,560,654	Medium
Recreation (Water)	£0	£8,638,504	£8,638,504	Medium
Physical Health	£0	£951,056	£951,056	Low
Total	**£3,913,600**	**£86,802,062**	**£82,888,462**	

6.1.1 Global Climate Regulation

This has been calculated by applying the emissions factors of different habitats present at the site for the baseline scenario. In the baseline the arable land emits carbon but this is offset by the grassland and woodland which sequester carbon. The carbon emitted/sequestered is multiplied by the carbon

values provided by DESNZ for appraisal as per HM Treasury Book guidance. For the proposed waterway, there is insufficient data available to evidence that canals sequester a notable amount of carbon. The Natural England report[18] notes that whilst carbon burial rates have been shown to be higher in human-made water systems, they can also be large sources of CO2 and CH4 emissions where sediment builds up. Additionally, the paper notes that managed grassland is a net emitter of carbon. Therefore, these estimates show that the waterway itself is a net emitter of carbon. However, these estimates are likely subject to change if green infrastructure, and natural planting areas are included in future assessments.

6.1.2 Air Quality Regulation

For the baseline scenario, the physical flow of air pollution regulation is calculated by applying biophysical estimates from Jones et al. (2017)[19] specifying tonnes of pollutant removed per ha of habitat area, to the areas in the asset register. This provides an estimate for the tonnes of pollutant removal for each (ha) of habitat per year for each of the four pollutants: PM2.5, NO2, SO2, O3. The monetary flow is calculated by applying the unit value of avoided health damage costs (or health benefits) per tonne of each pollutant removed from Jones et al. (2017)[19] to the tonnes of pollutant removed calculated in the physical flow. Approximately half the value from air pollution regulation for the baseline scenario results from PM2.5 removal by the woodland habitats.

For the proposed waterway, Jones et al. (2017)[19] notes that freshwater and grassland habitats provide air pollution regulation benefits by capturing pollutants. However, these impacts are less than the benefits provided by habitats in the baseline (such as woodlands). Therefore, these estimates show a negative value for air pollution regulation. These estimates are likely subject to change if green infrastructure, and natural planting areas are included in future assessments.

6.1.3 Flood Regulation

The baseline scenario is assumed to have no flood regulation benefits as there is minimal vegetation along the route, and any benefits in the form of water storage delivered by habitats in the baseline will be replaced by the waterway.

For the proposed waterway, flood regulation estimates were calculated by using the Stantec (2023) - Bedford and Milton Keynes Waterway Park Flood Risk Management Study Phase 2 Report[20]. This report provides an estimate (Option 1A) of the number of receptors at risk of flooding that could benefit in future avoided damages from the connection of Grand Union Canal to other waterbodies provided by the Bedford and Milton Keynes Waterway.

The monetary estimate, also from Stantec (2023), values the avoided flood damage costs due to the flood risk regulation benefits delivered by the new canal using Multi-Coloured Manual[22]. The valuation covers direct and indirect costs to both residential and non-residential properties that were built up to 2014 due to data availability[28]. This includes vehicle damages, evacuation costs and emergency costs. As it is a preliminary assessment it does not cover damages to infrastructure, transport, education agriculture and health services. Assumptions made in using this estimate include the inference of a price year consistent with the report date of 2023 and avoided annual damages that remain consistent over time[29]. The asset value of the flood regulation benefit delivered over the 60-year period is estimated at approximately £21.9m.

6.1.4 Water Supply

The baseline scenario currently has no capacity for the provision of water for abstraction purposes. For the proposed waterway, previous work by the WRE[20] has investigated the economic case of using the waterway for strategic water trading purposes to transfer flows of water from sources such as Grand Union Canal (GUC) to potential water customers along the route of the Waterway and then

[28] This Stantec 2023 report uses the latest National Receptor Database (NRD) which was published in 2014 for their flood risk assessment. To include an estimation including buildings built since 2014 would not be possible without running the flood risk model again with new National Receptor Database data.
[29] Specific information concerning these estimates is not clear in the report, but these assumptions are reasonable to make in the context of the assessment given that data from the Flood Risk Management Study provides the most accurate source of quantification and valuation of flood water regulation benefits of the canal and any changes in assumptions at this stage is likely to introduce a greater uncertainty of estimates.

onward on the River Great Ouse (RGO) downstream of Bedford. The physical flow data has been taken from the WRE water balance model, which estimates that during peak flows an estimated 8.9 million litres of water can be available to feed into RGO per day (Updated Water Balance for WRM Phase 2). This estimate was then extrapolated over a 365-day time period to calculate the annual potential for water transfer to the RGO to be used to supply water for abstraction purposes.

These estimates rely on the assumption that all water identified as available for the RGO within the water balance model will be used for public water supply, because of this assumption, the current values provided in the assessment should be considered as illustrative of the significance of these benefits but with a need for much more detailed refinement. Further assessment would be needed to incorporate more specific modelling estimates of water transfer for water abstraction which is intended for public use. For example, the WRE report highlights there may be a potential opportunity for Affinity Water to enhance the benefits from their investment in the Minworth-GUC SRO by diverting water from the GUC to the RGO via the BMKWP, for abstraction and storage in Grafham Water for their later use during times of need. Such a transfer and abstraction for storage in Grafham Water may also offer benefits to AWS as part of a wider regional scheme.

For the monetary value, a unit resource rent value for water abstracted for water supply, provided by ONS (2024)[16] is used. The resource rent approach is a method used to estimate the economic value of natural resources by calculating the surplus (or "rent") generated from their use after accounting for costs such as labour and capital. The ONS estimates the unit resource rent value to be £0.74 per cubic metre, representing the economic return to the ecosystem for providing raw water. Notably, the ONS acknowledges that the methodology used includes some processing value in its calculations, meaning the resource rent estimate may not fully isolate the value of the raw water itself. Additionally, this resource rent estimate may not fully represent the regional context since the marginal value of water resources varies according to regional demand and supply conditions.

6.1.5 Food Provisioning

The baseline scenario has approximately 14.3 ha of enclosed farmland. To estimate the physical flows, the NEVO tool[14] was used to calculate the percentage of land dedicated to cereal cropping, general cropping and livestock in the Bedford Ouse area, these percentages are quoted in Table 5 and then applied to the 14.3 ha of land in the baseline scenario.

Physical flow estimates were calculated using Defra (2025) farmland rent values[15], which provide per hectare values and represent average annual farmland rent values between 2020/21 - 2023/24 for various farm types. The rental values provide an indication of profitability of different farm types that can be applied to estimate the value of agriculture provisioning services. Midpoint values were calculated using the ranges provided by Defra for cereal crops, general crops and livestock farms and multiplied by the physical flows. The final estimates are expressed as negative values in the assessment as these farm areas will be replaced by the proposed waterway.

Table 5: Percentage of land used for different types of agriculture in the Bedford Ouse region (NEVO)

Type	Hectares of agricultural land in Bedford Ouse	Percentage of land
Cereal crops	84900	46%
General crops	44300	24%
Livestock	53800	29%

6.1.6 Recreation

A range of values is provided within recreation: welfare benefits to individuals, physical health benefits in terms of cost savings to the NHS and water-based tourism benefits. There should be no double-counting between these benefits as each relate to a different beneficiary group: individuals using the site, NHS for physical health and local businesses for water-based tourism benefits.

Physical flow estimates for valuing the welfare benefits to individuals and the cost savings from active visits relating to physical health are derived from ORVal. The ORVal model uses a Recreation Demand Model to estimate visit figures for sites based on factors like location, accessibility, nearby

population, and site features such as water bodies or picnic areas. For newly created sites in the tool, the model predicts how many people would substitute from nearby green/blue spaces and switch to the new site. Thus, two visit estimations are provided, 'newly created visits' which represent visits which would not have happened otherwise without the new green/blue space and 'total visit' which include new visits plus visits which were 'switched' from other green/blue spaces. Figure 3 shows a screenshot of the path created within ORVal in yellow and Table 6 provides the visit outputs from ORVal.

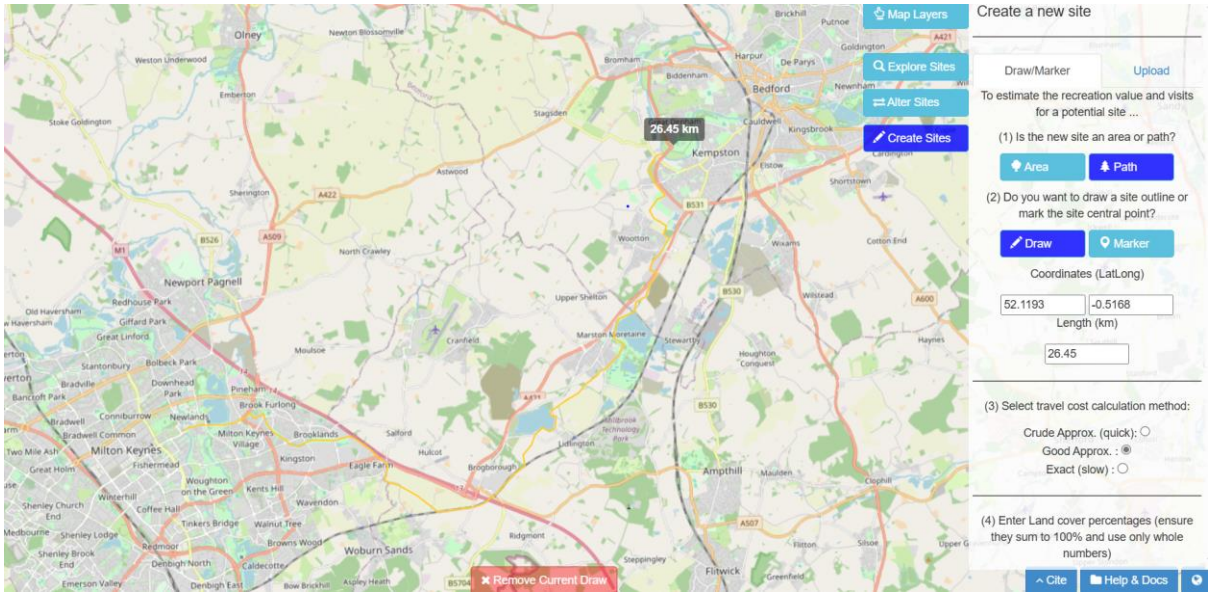

Figure 3: Path created within ORVal[23]

Table 6: ORVal visit outputs from the Waterway

Type	Estimated visits (per year)
Estimated newly created visits	37,589
Estimated total visits	119,530

Welfare benefits of recreational visits

This refers to the wellbeing benefits to individuals from recreational visits within the proposed waterway. The blue and green spaces provided by the waterway will deliver a use value to individuals related to the increase in wellbeing associated with each visit.

Welfare benefit values are provided by ORVal and are estimated to be £398k/year for the proposed waterway based on total visits, equating to £3.33 per visit. These are calculated using the travel cost method, integrated within the model – this is a survey-based technique that uses the costs incurred by individuals taking a trip to a recreation site (travel costs, entry fees, opportunity cost of time) as a proxy for the recreational value of that site.

To perform sensitivity analysis a high value is used from Simetrica (2018)[30], which provides well-being values of waterway use in England and Wales (£6.63/ visit, 2018 prices) and a low value is used from the ONS (2024) natural capital account[16] for travel expenditure to nature-based recreation sites (£2.38 / trip, 2023 prices). These are multiplied by **total** visit estimates provided by ORVal as ENCA notes that all visits represent a welfare benefit, even for those who have 'switched' from other green/blue spaces (for example, because a new site now requires less travel time or cost to visit). Table 7 provides the welfare estimates for the low and high values and central values provided by ORVal.

[30] Simetrica (2018): Assessing the wellbeing impacts of waterways usage in England and Wales

It should be noted that the potential for overlap in recreational (wellbeing) benefits with benefits to individuals calculated using the Active Model Appraisal Toolkit (AMAT) has been considered as part of the natural capital assessment but deemed to have minimal effect. As typically 30% of the value of AMAT benefits are from changes to 'Journey Ambience' which considers environmental conditions, this could overlap with the wellbeing benefits calculated, although this would only apply to active recreational visits that have also been considered when applying the AMAT tool.

Table 7: Range of values for annual recreation benefits

Recreational benefits (Low Estimate) (2025 prices)	Recreational benefits (Central Estimate) (2025 prices)	Recreational benefits (High Estimate) (2025 prices)
£299,824	£398,172	£1,007,812

Physical Health Cost Savings

Recreation from active visits refers to the physical health benefits from recreational activity within the proposed waterway which leads to cost savings to the NHS. The proposed waterway provides areas for recreation such as towpaths, waterways and water spaces. Recreation benefits are realised through the physical health benefits from 'active visits' as defined by White et al., (2016)[24] as an activity with a "metabolic equivalence of task (MET) greater than 3 and undertaken for longer than 30 minutes".

To calculate active visits, Defra uses White et al., (2016) to estimate that approximately 18.8% of recreational activities are deemed 'active'. This percentage is then multiplied by the 'newly' created visits as provided by ORVal; this results in annual newly created active visits equal to 7,067 visits. As opposed to the methodology used to value welfare benefits from visits, ENCA recommends that only 'newly created visits' be used for valuing physical health to isolate the additional physical health benefits, ignoring the visitors who substituted into visiting the new site.

The monetary flow is calculated by multiplying the number of active visits with the NHS cost savings estimate per active visit. Each active visit per week is then predicted to gain 0.010677 QALYs (White et al., (2016))[24], which is then multiplied by the total cost for 1 QALY (£16,943 in 2023 prices) and then divided by 52 weeks. Inflated to 2025 prices, the value of each active visit for physical health is £3.93. NHS cost savings per year are estimated by multiplying active visits with the £3.93 figure.

Please note that, in this value chain, the beneficiary of physical health benefits is the NHS via cost savings, whereas the beneficiaries of active travel, calculated using the Active Model Appraisal Toolkit (AMAT)considers the value of health benefits to the individual, since the beneficiaries are different, we can assume that there is no double-counting.

Water-based recreational activities

The proposed waterway will increase the number of visitors to nearby water sports activity sites, including Stewartby Lake, Box End Park and Willen Lake Park. To include the benefits of attracting additional visitors to the water sports sites, estimates from the Peter Brett report[9] were used. These are provided in Table 8 and were inflated to 2025 prices for the assessment. These figures represent the number of additional visitors attracted to each of the water-based activities annually and the associated tourism spending related to these visitors.

Table 8: Tourism spend related to water-based activities

	Number of annual visitors	Estimated visitor spend (2018 prices)
Canal Boating	16,259	£203,630
Motor/Power Boating	7,222	£142,907
Fishing/Angling	26,299	£20,645

Source: Peter Brett (2018): Bedford & Milton Keynes Waterway, Economic Analysis

6.2 Biodiversity

6.2.1 Introduction

The Bedford Milton Keynes Waterway (BMKW) has the potential to deliver significant biodiversity benefits by enhancing ecological connectivity and supporting a range of habitats. Canals serve as vital ecological corridors, linking fragmented habitats and providing essential ecosystem services such as pollination, water regulation, and habitat provision[11]. The green margins, bankside and aquatic ecosystems within the BMKW could further strengthen these functions, supporting both biodiversity and wider environmental benefits.

Biodiversity underpins many ecosystem services, from soil formation and nutrient cycling to disease regulation and carbon sequestration. However, the challenge in natural capital assessments is ensuring biodiversity is appropriately recognised without double counting its value within the monetary accounts. Current best practice, following Defra's Enabling a Natural Capital Approach (ENCA)[1], involves incorporating biodiversity as an asset within the register while ensuring that its contribution is reflected through the value of final ecosystem services rather than being valued separately. One option of measuring the physical flow of biodiversity for the asset register is to use the Defra Statutory Metric for Biodiversity Net Gain (BNG)[26], which uses habitat and condition data, to calculate units of biodiversity.

However, biodiversity can also be a 'final' ecosystem service, such as the value derived from the direct appreciation of nature and enjoyment of activities such as bird watching. Hence, some of the approaches to monetary valuation focus on these final services:

1. Stated Preference Methods – These methods estimate the public's willingness to pay for biodiversity conservation, including the value people place on species protection, habitat restoration, and recreational benefits. Previous studies, such as Christie et al. (2011), have assessed the value of maintaining Sites of Special Scientific Interest (SSSIs) and improving biodiversity through conservation initiatives.

2. Market-Based Approaches – These methods assess biodiversity's contribution to ecosystem services that directly benefit society. For example, improvements in biodiversity could enhance pollination services for agriculture, contributing to increased crop yields and economic gains.

3. Cost-Based Approaches – Similar to the cost of carbon, these approaches estimate the financial costs of restoring or replacing biodiversity. With the introduction of mandatory Biodiversity Net Gain (BNG), habitat-based Biodiversity Units (BUs) are increasingly used to assign monetary values within habitat restoration projects. The Treasury Green Book working group is currently exploring a cost-based framework for biodiversity, which may provide useful insights for incorporating biodiversity valuation into the BMKW's economic case.

6.2.2 BNG Biodiversity Unit (BUs) estimates

Biodiversity units are calculated using the Defra Statutory Metric for Biodiversity Net Gain (BNG). The estimated Biodiversity Units (BUs) are presented in Table 9 and Table 10. An important caveat again is that these estimates are derived from the boundary drawn for the Waterway to map the natural assets; these estimates of BUs should be seen as preliminary which would need to be refined with more precise estimates. In addition, various assumptions had to be made which may affect these estimates. For example, to assess the condition of the sites, a review of the current area was done in maps, leading us to assume that all habitat areas were in moderate condition, using map imagery. The estimates do not include the 10% net gain which would be required where there are losses to offset. It is important to note that for the purposes of BNG, the biodiversity unit outputs for each type of unit, should not be summed, traded, or converted between types. Thus, the 34.66 watercourse units gained cannot be used to satisfy the habitat areas lost, such as woodland. For further discussion of the requirement to meet 10% BNG and a high-level assessment of the implications for the natural capital assessment, see section 6.2.3.

Table 9: Total biodiversity units for baseline scenario

Habitat Type	Baseline total habitat

	Biodiversity Units (BUs)
Other woodland; broadleaved	31.01
Other coniferous woodland	0.05
Cereal crops	28.62
Modified grassland	97.04
Other neutral grassland	22.04
Watercourse	-

Table 10: Total biodiversity units for proposed waterway

Habitat Type	Proposed waterway total habitat Biodiversity Units (BUs)
Other woodland; broadleaved	-
Other coniferous woodland	-
Cereal crops	-
Modified grassland	48.63
Other neutral grassland	-
Watercourse	38.36

Since alternative valuation methods were not suitable for this assessment, biodiversity values were estimated by multiplying the BUs by the market prices[27] for different habitat types to estimate biodiversity values for both the baseline and proposed waterway scenarios.

The BNG market prices used in this assessment reflect the current average prices paid for off-site biodiversity units to help developments achieve biodiversity net gain. While these prices do not directly represent the true value of biodiversity, they serve as a proxy to illustrate the potential differences in biodiversity value between the current baseline and the proposed waterway development. Estimated biodiversity values can be found in Table 11 for the baseline and proposed waterway scenario.

Results from this analysis show that there is currently a net positive impact on biodiversity values of approximately £1.5m. This is because, watercourse units are, on average, valued higher at £165k/unit, whereas, woodland units, for example, are priced at £33k/unit However, these estimates exclude the expectation that this waterway will deliver 10% BNG, which will delivery further benefits. See 6.2.3 for an exploration of the costs and benefits associated with meeting this requirement.

Table 11: Biodiversity values for baseline and proposed waterway scenario, using market prices (2024 prices)

Type	Habitat Units	Value (£)
Baseline	339.89	£5,482,616
Proposed Waterway Scenario	86.99	£7,636,385
Net change		£2,153,769

A requirement for the development of this proposed waterway is 10% BNG. The Report for B&MK Trust on BNG by Lichfields (2024)[12] highlighted that the delivery of the BMK Waterway could lead to a range of opportunities from the creation of new habitats including the delivery of biodiversity gains. It reviewed the potential for the scheme to deliver more than 10% net gain in biodiversity (i.e., in excess of the mandatory requirement) and how the Trust could optimise any benefits arising over and above the requirements that arise from the 'development' of the BMK itself. Based on the understanding of

the scheme when the report was completed, it was anticipated that BMK would lead to a loss of most existing onsite habitats, which will have a biodiversity value attached. However, they expected that there would be scope for the scheme to be designed in such a way that it leads to a BNG significantly in excess of the mandatory 10%. This assumes that, overall, the habitats enhanced and created would be of a higher distinctiveness and be managed to a better condition than the habitats lost. This assumption is informed by the classification of habitats in the metric which categorise most wetland habitats, floodplain grassland and some ponds as high or very high distinctiveness habitats, while cropland is categorised as low or medium distinctiveness. However, the report highlighted that this would need to be verified in practice as the scheme details are developed. For example, as proposed in the OBC, planting 11.7 ha of natural planting along the rural canal bank can deliver 63 additional biodiversity units - at a market price of £49.3k per unit of highly distinctive woodland/forest habitats, this could lead to a gain in value of approximately £3.1m. This means that planning for the waterway will need to include at least a 10% net gain in biodiversity, for each of the same broad habitat types as those in the baseline and watercourse units cannot act as could substitutes for the area habitat units lost. Integrating a BNG strategy into future assessments will mean that the biodiversity values should increase by at least 10%, plus the 50.29 additional watercourse units.

6.2.3 Implications for natural capital assessment of 10% BNG

The natural capital assessment set out above is based on the core changes to habitats identified and implications for ecosystem services and changes in natural capital benefits. However, it is recognised that additional actions to meet 10% BNG are planned to be undertaken which would have implications for both costs and benefits. This section provides a high-level exploration of the potential additional natural capital benefits by applying recent economics literature on the costs of habitat creation and the benefits associated with these actions. This analysis provides an illustrative estimate of the potential costs associated with achieving 10% BNG, based on current literature. However, the unique context of the BMK Waterway is likely to influence these costs. More detailed planning specific to the 10% BNG target will be needed to produce reliable cost estimates. For this reason, the figures from this analysis are not included in the wider Economic Case.

In compliance with mandatory 10% BNG requirements, the development of the BMK Waterway will need to implement a BNG strategy. Currently, preliminary estimates show an overall loss of 31.06 BU of woodland, 119.8 BU of grassland and 28.62 BU of arable land. To meet 10% BNG, development of the BMK Waterway will need to replace habitats on a like-for-like basis in terms of type, distinctiveness and condition or with higher distinctiveness habitats. For the calculations in Table 12, it is assumed that to attain net gain for the arable land lost, these will be converted into grassland (in addition to the grassland areas also lost). Additionally, habitat areas in hectares are taken from the baseline asset register, since there is limited literature analysing costs of creating habitats per biodiversity unit.

Using cost estimates of habitat creation from Oxford University (2023)[31], we calculate approximate costs associated with creating habitats to meet 10% BNG. The data used in Oxford University (2023) is taken from a broad review of current literature which calculates the costs associated with habitat creation. These sources are then used to calculate the mean values for each broad habitat type.

These costs estimates are applied to the estimated habitat required to offset the BUs loss plus 10% net gain under grassland and woodland. In total, it would cost approximately £859k for the BMK Waterway to meet 10% BNG.

Table 12: Illustrative scenario of estimated costs of habitat creation to meet BNG 10% (Present Values)

Habitat	Estimated Cost per ha (£/ha)	Habitat areas (ha)	Habitat creation to meet BNG +10% (ha)	Estimated Total Costs of Habitat Creation to meet 10% BNG
Neutral grassland	£18,170.00	41.30	45.43	£825,000

[31] Oxford University (2023): The potential contribution of revenue from Biodiversity Net Gain offsets towards nature recovery ambitions in Oxfordshire

Mixed woodland	£8,951.00	3.39	3.73	£33,000
Total		44.69	49.16	£859,000

To provide an indicative estimate of the potential benefits associated with this habitat creation, BNG market prices were applied to value the 10% gain in biodiversity units (as highlighted earlier, BNG prices are applied as proxy for value). This is in addition to the value of watercourse units that will be created as a result of the canal.

Table 13: BNG Benefit Estimates with BNG 10% Net Gain (Present Values)

Habitat	Market Prices (£/BU)	Biodiversity units lost to BMKW (BU)	BNG scenario biodiversity units (10% BNG) (BU)	Estimated Benefits for BMKW, with 10% BNG
Neutral grassland	£27,200	147.7	162.47	£4,419,000
Mixed woodland	£32,800	31.15	34.27	£1,124,000
Total			196.74	£5,543,000

Additionally, Table 14 consolidates both the estimated costs and benefits for BNG, to calculate the net benefits from BNG. These should be interpreted as a high-level approximation of the costs and benefits associated with 10% BNG for the BMK Waterway development.

Table 14: Net Benefit Estimations (Present Values)

Habitat	Estimated BNG Costs (£)	Estimated BNG Benefits (£)	Estimated BNG Net Benefits (£)
	£859,000	£5,543,000	£4,684,000

From these calculations, total benefits from implementing BNG on the BMK Waterway development will equal the total net benefits from the implementation of BNG plus the benefits from the waterway (using market prices as a proxy). Total benefits equal approximately £11m.

Table 15: Total Estimated Benefits (Present Values)

Benefit	Value
Estimated BNG Net Benefits (£)	£4,684,000
Watercourse benefits (market prices, £)	£6,314,000
Total (£)	£10,998,000

6.2.4 Future considerations for BNG

To comply with the statutory requirements, the immediate next steps for the BMKW Trust would be to expand on the previous Lichfields (2024) report and develop a strategic plan for BNG. The main recommendations to highlight for consideration are:

- Understand the condition, distinctiveness and significance of the baseline habitats on the BMKW route and consider re-drafting the route to avoid loss of habitats which have high significance or distinctiveness or are in favourable condition.
    - For example, consider re-drafting the route to avoid areas of high strategic significance. Currently, 3.39 ha of woodland habitats lost to the construction of the canal are in areas of high strategic significance, increasing the potential losses in biodiversity value. These are priority habitats mentioned in local plans for Central Bedfordshire and Bedford

- Include plans for natural planting along the canal edge and identifying mitigation areas close to the canal to support BNG.

With more detail of the specific approach to meeting BNG net gain and the required actions, this would allow for a more accurate estimate of the costs and benefits to add into the natural capital assessment and feed into the Economic Case.

6.3 Summary

The assessment demonstrates positive net natural capital benefits of the proposed waterway compared to the baseline (present value terms over a 60-year period). This is excluding the introduction of green infrastructure, natural planting or parkland in the assessment scenario, suggesting that the proposed waterway should have natural capital benefits associated with the proposed design.

These natural capital benefits are driven by the potential for the Waterway to provide water transfer benefits for water supply, followed by recreational opportunities. There are some potential disbenefits, notably the loss of habitats which provide global climate, air pollution regulation services and farmland profit, but these are outweighed by the positive natural capital benefits. Moreover, integrating plans for green infrastructure into future assessments will likely mitigate these disbenefits.

Separate to the natural capital assessment, the BNG assessment provides a preliminary view of impact on Biodiversity Units with losses in Area habitat BUs but gains in Watercourse Bus. As an indication, applying average habitat creation cost estimates to the habitat areas lost, plus 10% BNG suggests that the costs of implementing BNG amount to approximately £859k. Furthermore, using market prices, the net benefits of 10% net gain amount to approximately £4.7m. This value, in additional to the proposed value of the watercourse (using market prices), leads to a total biodiversity benefit of approximately £11m of the proposed waterway. These figures are intended to illustrate the potential costs and benefits associated with achieving 10% BNG for the BMK Waterway development. They are based on average estimates from current literature, and a more detailed assessment specific to the BMK Waterway would be necessary to produce more reliable results. For this reason, these values are presented for illustrative purposes only and have not been included in the broader Economic Case.