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# Measuring Biodiversity Net Gain with Sweet for ArcGIS

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**Better outcomes  
through innovation  
and excellence.**

**Engineering.  
Management.  
Development.**



# Biodiversity is under threat in the UK

Figures from State of Nature 2023, available at [www.stateofnature.org.uk](http://www.stateofnature.org.uk)

# 19%

Across the UK species studied have declined on average by 19% since 1970.

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# 16%

Nearly one in six species are threatened with extinction in Great Britain.

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# 151

of 10,008 species assessed have already become extinct since 1500.

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**Biodiversity Net Gain** makes sure  
development has a measurably  
positive impact on biodiversity

**10% BNG** now mandatory in England

# How do you measure biodiversity?

The Biodiversity Metric uses habitats as a proxy for biodiversity

## Size

How large or small is the habitat?

## Type

Is the habitat of particular ecological importance?

## Location

Where is it in relation to the development, is it in a priority area?

## Quality

What condition is the habitat in?

# How do you measure biodiversity?

The Biodiversity Metric uses habitats as a proxy for biodiversity

Pond SE 24

Condition Sheet: POND Habitat Type		
UKHab (Habitat types)		
Lakes - Ponds (priority habitat)		
Lakes - Ponds (non-priority habitat) →		
Lakes - Temporary lakes, ponds and pools [Use this condition sheet for Temporary ponds and pools, use Lake condition sheet for Temporary lakes]		
Lakes - Ornamental lake or pond [Use this condition sheet for Ornamental ponds, use Lake condition sheet for Ornamental lakes]		
Site name/location		Onsite/offsite
Central grid reference of habitat		Unique polygon reference
Limitations (if applicable)		Metric 3.0 survey reference (if condition assessment of this polygon relates to a wider habitat survey)
Habitat Description		
SE24. potentially man-made. woodland pond surrounded by young woodland no evidence. older willow / to non dense woodland.		
See UKHab		
Other than for non-priority ponds, which are those which do not meet either the definition of (i) priority habitat ponds or (ii) ornamental ponds		
Condition Assessment Criteria	Condition Achieves (Y/N)	Notes/Justification
<b>CORE CRITERIA</b> - applicable to all ponds (woodland and non-woodland):		
1 The pond is of good water quality, with clear water (low turbidity) indicating no obvious signs of pollution. Turbidity is acceptable if the pond is grazed by livestock.	Y	- Clean although leaf layer or seems clear
2 There is semi-natural habitat (i.e. moderate distinctiveness or above) for at least 10 m from the pond edge.	Y	- Spots + woodland adjacent
3 Less than 10% of the pond is covered with duckweed or filamentous algae.	Y (TBC)	- Feb survey - water zone
4 The pond is not artificially connected to other waterbodies, either via streams, ditches or artificial pipework.	Y	- no evidence artificial - natural stream?
5 Pond water levels should be able to fluctuate naturally throughout the year. No obvious dams, pumps or pipework.	Y	
6 There is an absence of non-native plant and animal species?	Y	
7 The pond is not artificially stocked with fish. If the pond naturally contains fish, it is a native fish assemblage at low densities.	Y	
<b>ADDITIONAL CRITERIA</b> - only applicable to non-woodland ponds:		
8 In non-woodland ponds, plants, be they emergent, submerged or floating (excluding duckweeds) <sup>2</sup> , should cover at least 50% of the pond area that is less than 3 m deep.		
9 The surface of non-woodland ponds is no more than 50% shaded by woody bankside species.		
		Number of criteria passed
Condition Assessment Result	Condition Assessment Score	Score Achieved/9
If 8 criteria assessed (woodland ponds):		
Passes 7 of 7 criteria	Good (3)	7
Passes 5 or 6 of 7 criteria	Moderate (2)	
Passes 3 or 4 of 7 criteria	Poor (1)	

## Quality

What condition is the habitat in?

# Enter Sweet for ArcGIS

- **Sweet for ArcGIS** is an app for data collection with built-in configurable data quality checks
- Developed by Esri UK
- Accessible via web browser or standalone app (Windows, Android, and iOS) so can be used in the office and on site
- Highly configurable for different applications, different data validation logic





# Measuring BNG with Sweet for ArcGIS

- We used Sweet to create a tool which enables ecologists to accurately and efficiently collect the full set of data required to calculate the baseline Biodiversity Metric score for a site
- Hosted on our internal ArcGIS Enterprise Portal
- **Topological editing** ➡ habitat data correct at the point of capture
- **Attribute rules** ➡ surveyors know what information needs to be collected about habitats

Pond SE 24

Condition Sheet: POND Habitat Type

Lakes - Ponds (priority habitat)

Lakes - Ponds (non-priority habitat) ➡

Lakes - Temporary lakes, ponds and pools [Use this condition sheet for Temporary ponds and pools, use Lake condition sheet for Temporary lakes]

Lakes - Ornamental lake or pond [Use this condition sheet for Ornamental ponds, use Lake condition sheet for Ornamental lakes]

Site name/location	Onsite/offsite
Central grid reference of habitat	Unique polygon reference
Limitations (if applicable)	Metric 3.0 survey reference (if condition assessment of this polygon relates to a wider habitat survey)

Habitat description

SE24.  
potentially meadow. woodland pond surrounded by young woodland with evidence of older willow / a non dense scrubland.

See UKHab

Other than for non-priority ponds, which are those which do not meet either the definition of (i) priority habitat ponds or (ii) ornamental ponds, the following criteria apply to all ponds.

Condition Assessment Criteria	Condition Active (Y/N)
<b>CORE CRITERIA - applicable to all ponds (woodland and non-woodland):</b>	
1 The pond is of good water quality, with clear water (low turbidity) indicating no obvious signs of pollution. Turbidity is acceptable if the pond is grazed by livestock.	Y
2 There is semi-natural habitat (i.e. moderate distinctiveness or above) for at least 10 m from the pond edge.	Y
3 Less than 10% of the pond is covered with duckweed or filamentous algae.	Y (TBC)
4 The pond is not artificially connected to other waterbodies, either via streams, ditches or artificial pipework.	Y
5 Pond water levels should be able to fluctuate naturally throughout the year. No obvious dams, pumps or pipework.	Y
6 There is an absence of non-native plant and animal species <sup>2</sup> .	Y
7 The pond is not artificially stocked with fish. If the pond naturally contains fish, it is a native fish assemblage at low densities.	Y
<b>ADDITIONAL CRITERIA - only applicable to non-woodland ponds:</b>	
8 In non-woodland ponds, plants, be they emergent, submerged or floating (excluding duckweeds <sup>3</sup> ), should cover at least 50% of the pond area that is less than 3 m deep.	
9 The surface of non-woodland ponds is no more than 50% shaded by woody bankside species.	

Condition Assessment Result	Condition Assessment Score	Score Achieved
If 8 criteria assessed (woodland ponds)	Good (3)	7
Passes 7 of 7 criteria	Good (3)	
Passes 5 or 6 of 7 criteria	Moderate (2)	

Testwood BNG UKHab Tool

Pan Select Create Add Subtract

Layers

Properties

Selection

How Many Age Classes Are Present?

3

What % Of The Woodland Has Significant Browsing Damage Evident?

0

What % Of The Woodland Do Invasive Plant Species (E.G Rhododendron, Laurel) Cover?

0

Is Rhododendron Or Cherry Laurel Present?

No

What Invasive Species Are Present?

Himalayan balsam

How Many Native Tree Species Were Present Across The Woodland Parcel?

5

What % Of The Canopy Trees Are Native?

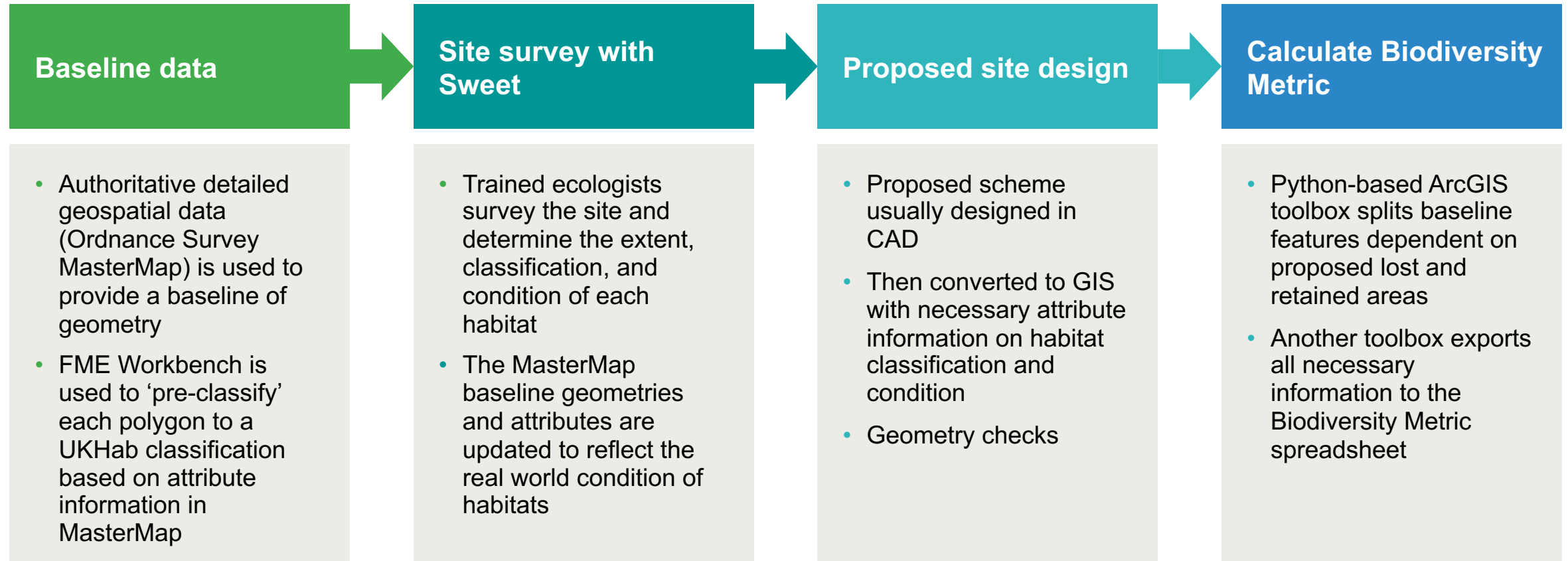
90

What % Of The Understory Shrubs Are Native?

100

Is The Woodland Greater Than 10ha In Area?

# Wider context: the overall BNG workflow



# Conclusions

1

**Biodiversity** is key to sustaining life on Earth, but increasingly under threat

2

**Biodiversity Net Gain** aims to ensure future developments lead to an increase in biodiversity

3

**Geospatial technology** is key to accurately measuring biodiversity, and therefore enabling Biodiversity Net Gain

4

**Sweet for ArcGIS** provides the tools to accurately and efficiently measure biodiversity



**Thank you**

