Retford Circular Economy Project Environmental Statement Addendum – Volume 3 Technical Appendices

Technical Appendix 8.4: Updated Biodiversity Net Gain Assessment

January 2024

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1. INTRODUCTION

Environmental Resources Management (ERM) has been instructed by Lound Hive Limited (the 'Applicant') to undertake a Biodiversity Net Gain (BNG) assessment of the Retford Circular Economy Project (the 'Proposed Development'), centred on British National Grid Reference SK 69231 84761 (the 'Site'). This document accompanies a planning application for the Proposed Development, which entails the extraction of pulverised fuel ash (PFA) from former disposal lagoons, followed by infilling and restoration. This document forms a Technical Appendix to the Environmental Statement Addendum (ESA), and further information regarding the ecology and ornithology assessment of the Proposed Development can be found in Chapter 8, Volume 1 of the Environmental Statement (ES) and ESA.

This BNG assessment provides an update to the previous BMA produced in February 2023. In July 2023 the Applicant revised the working scheme, including the approaches to extraction and restoration, for the Proposed Development (hereafter referred to as the 'Amended Proposed Development'). Changes relevant to this assessment are related to the PFA extraction site only and the operations herein, which includes the High-Rise and Low-Rise areas, known collectively as 'Area A' (see Figure 8.4.1). Amendments are detailed in Chapter 5 of the ESA1 and on the restoration plan included as Figures 7.12 to 7.14 in Volume 2 of the ESA, and were proposed to address consultees comments including:

- About dust, noise, and visual impact from the proposed extractive operations, with the provision of more clarity, detail, and highlighting the robust measures/mitigation that form part of the design to manage these potential impacts; and
- Those raised by Nottinghamshire County Council ('NCC') Ecology and the Nottinghamshire Wildlife Trust ('NWT') about effects of the Proposed Development and the proposed restoration scheme.

This BNG report and supporting Biodiversity Metrics (Appendices B and C) form the Biodiversity Net Gain (BNG) assessment of the Amended Proposed Development. A BNG assessment and provision of a 10% Net Gain for biodiversity is to be mandated under the Environment Act 2021. There is a transition period before the net gain requirements of the Environment Act 2021 come into effect in January 2024[2] for new development in England where planning permission is granted under the Town & Country Planning Act 1990 (TCPA) regime. BNG is currently encouraged through the national[3] and local plans and policies[4][5].

This BNG assessment also takes account of the findings of an updated habitat survey (detailed in Technical Appendix 8.7 included in Volume 3 of the ESA) using the UK Habitat Classification[6] (UKHab) categories and conditions (Habitat Survey method/classification[7]). Use of UKHab provides a dataset better suited for use with the Biodiversity Net Gain (BNG) metric 4.0 and for future monitoring of the Site.

[1] ERM (2023) Chapter 5: Retford Circular Economy Project Environmental Statement Addendum, Lound Hive Limited, October 2023

[2] https://www.gov.uk/government/news/biodiversity-net-gain-moves-step-closer-with-timetable-set-out.

[3] Ministry of Housing, Communities and Local Government (2021) National Planning Policy Framework [Online] Available at: National Planning Policy Framework (publishing.service.gov.uk) (Accessed September 2023)

[4] Nottinghamshire Biodiversity Action Group: Habitat Action Plans (HAPs) [Online] Available at: Habitat Action Plans – Nottinghamshire Biodiversity Action Group (nottsbag.org.uk) (Accessed September 2023)

[5] Nottinghamshire Local Mineral Plan Policy SP2, Available at: Minerals Local Plan | Nottinghamshire County Council (Accessed September 2023)

[6] UK Habitat Classification System version 1.1 [Online] Available at: ukhab – UK Habitat Classification (Accessed June 2023)

[7] Phase 1 habitat classification [Online] Available at Handbook for Phase 1 habitat survey (jncc.gov.uk)

The Amended Proposed Development phases total over 22 years and the Outline Monitoring and Mitigation plan[8] (February 2023, included as Technical Appendix 8.6 in Volume 3 of the ES) describes the phased approach and the ongoing survey requirements. Updated information relating to this document is also included within Chapter 8, Volume 1 of the ESA. This document sets out the net gain that is envisaged, but revised calculations would be undertaken per phase when landscaping is finalised, and all requirements are known. The restoration proposals reflect stakeholder views and seek to complement biodiversity features of the Site of Special Scientific Interest (SSSI), the Local Wildlife Site (LWS) and other habitats such as woodland / wetland.

[8] Arcus (2023) Outline Monitoring and Mitigation Plan. Retford Circular Economy Project, Lound Hive Limited, February 2023.

2. METHODOLOGY

2.1 Overview

This report has been produced in accordance with the methodology set out in the following guidance documents (republished in April 2023):

- The Biodiversity Metric 4.0 – User Guide9; and
- The Biodiversity Metric 4.0 – Technical Supplement[10] .

This approach calculates the amount of biodiversity units produced post-construction and allows a comparison to be made with the baseline biodiversity units pre-construction. This provides an indication of the Amended Proposed Development's potential to provide a net gain in biodiversity. The baseline pre-construction biodiversity units were based on the findings of the updated baseline surveys using the UKHab classification (Technical Appendix 8.7: Updated Habitat Data[11]). The post-construction biodiversity units are based on the Revised Indicative Landscape Restoration Plan (provided in Appendix A, Figure 8.4.2[12] and Figures 7.12 to 7.14 in Volume 2 of the ESA).

The Site baseline defined for the purposes of the BNG assessment represents the maximum extent of the Main Operational Site (Area A) (Figure 8.4.1, Appendix A) and covers 105.84 ha.

2.2 Good Practice Principles

The Chartered Institute of Ecology and Environmental Management (CIEEM) sets out a series of good practice principles for biodiversity net gain (BNG)[13]. Table 2.1 describes alignment with these principles throughout the Amended Proposed Development process.

Table 2.1: CIEEM's UK good practice principles for biodiversity net gain and evidence of compliance.

Principle	In Practice	Justification
1. Apply the mitigation hierarchy	Do everything possible to first avoid and then minimise impacts on biodiversity. Only as a last resort, and in agreement with external decision-makers where possible, compensate for losses that cannot be avoided. If compensating for losses within the development footprint is not possible or does not generate the most benefits for nature conservation, then offset biodiversity losses by gains elsewhere.	The majority of the Site comprises modified grassland with habitats of higher nature conservation value typically located around the margins. As much of the marginal habitat has been retained as possible and the red line boundary avoids the SSSI and as much of the LWS as possible. The restoration proposals, that take account of stakeholder engagement, will deliver Biodiversity Net Gain (BNG) in the red line boundary.
2. Avoid losing biodiversity that	Avoid impacts on irreplaceable biodiversity – these impacts cannot	Not applicable as no irreplaceable habitats identified on-site.

[9] Natural England Biodiversity Metric 4.0- User Guide [Online] Available at: The Biodiversity Metric 4.0 - JP039 (naturalengland.org.uk) (Accessed September 2023)

[10] Natural England Biodiversity Metric 4.0- Technical Annex 2 -Technical Information [Online] Available at: The Biodiversity Metric 4.0 - JP039 (naturalengland.org.uk) (Accessed September 2023)

[11] ERM (2023) Environmental Statement Technical Appendix 8.7: Updated Habitat Data. September 2023.

[12] Revised Indicative Landscape Restoration Plan (Drawing 4092_DR_LAN_101_Rev7)

[13] Baker et al (2016) Biodiversity net gain. Good practice principles for development, A practical guide. CIEEM, IEMA, CIRIA, UK. ISBN 978-0-86017-791-3.

Principle	In Practice	Justification
cannot be offset by gains elsewhere	be offset to achieve No Net Loss or Net Gain.	
3. Be inclusive and equitable	Engage stakeholders early, and involve them in designing, implementing, monitoring, and evaluating the approach to Net Gain. Achieve Net Gain in partnership with stakeholders where possible and share the benefits fairly among stakeholders.	Stakeholder engagement has been ongoing on this project since the outset, including in the approach to BNG.
4. Address Risk	Mitigate difficulty, uncertainty and other risks to achieving Net Gain. Apply well-accepted ways to add contingency when calculating biodiversity losses and gains in order to account for any remaining risks, as well as to compensate for the time between the losses occurring and the gains being fully realised.	The latest Natural England Biodiversity Metric (version 4.0) was used to assess the baseline biodiversity units and potential net gains following restoration. Monitoring will be ongoing throughout the progressive restoration works to monitor progress to achieving target conditions.
5. Make a measurable net gain contribution.	Achieve a measurable, overall gain for biodiversity and the services ecosystems provide while directly contributing towards nature conservation priorities.	This report sets out measurable gain that could be achieved by the Amended Proposed Development which contributes to local priority habitats and the species they support (see Section 2.3.3).
6. Achieve the best outcomes for biodiversity	Achieve the best outcomes for biodiversity by using robust, credible evidence and local knowledge to make clearly justified choices when: Delivering compensation that is ecologically equivalent in type, amount and condition, and that accounts for the location and timing of biodiversity losses; Compensating for losses of one type of biodiversity by providing a different type that delivers greater benefits for nature conservation; Achieving Net Gain locally to the development while also contributing towards nature conservation priorities at local, regional and national levels; Enhancing existing or creating new habitat; and Enhancing ecological connectivity by creating more, bigger, better and joined areas for biodiversity.	This assessment is based on recent habitat information recorded in June 2023. The indicative restoration plan and its content has been developed in consultation with NCC and NWT to provide compensation for Site losses and contribute to local nature conservation objectives including connectivity with local sites of importance (e.g., Sutton and Lound Gravel Pits SSSI and Sutton and Lound LWS). The habitats created compensate for those lost and wherever possible seek to provide alternative habitat types that deliver a greater benefit for nature conservation than the existing habitats. The target conditions within the metric were based on the Natural England condition assessment sheets.

Principle	In Practice	Justification
7. Be additional	Achieve nature conservation outcomes that demonstrably exceed existing obligations (i.e., do not deliver something that would occur anyway).	Without development the Site would be retained at its current predominantly pastoral baseline. In line with the Amended Proposed Development, significant habitat creation would occur providing enhancements both on Site and in the local area, due to increased connectivity. Creation includes habitats targeted in the Nottinghamshire Minerals Local Plan that are not on Site at present.
8. Create a Net Gain legacy	Ensure Net Gain generates long-term benefits by: Engaging stakeholders and jointly agreeing practical solutions that secure Net Gain in perpetuity; Planning for adaptive management and securing dedicated funding for long-term management; Designing Net Gain for biodiversity to be resilient to external factors, especially climate change; Mitigating risks from other land uses; Avoiding displacing harmful activities from one location to another; and Supporting local-level management of Net Gain activities.	The applicant is committed to a management period of at least 30 years. The restoration works would be monitored and reviewed on a phase-by-phase basis and an adaptive management process would be adopted to allow any amendments to be made as appropriate to reflect changes in circumstances. The approach would seek to complement local nature conservation activities.
9. Optimise sustainability	Prioritise Biodiversity Net Gain and, where possible, optimise the wider environmental benefits for a sustainable society and economy.	The Amended Proposed Development is for the extraction of PFA, a sustainable secondary aggregate and cement substitute, from former disposal lagoons. The Amended Proposed Development would contribute very significantly towards the government's Net Zero Strategy. A key component of the strategy is to encourage the adoption of circular economy practices whereby resource utilisation and productivity is maximised. This includes schemes for end-of-life recycling of goods and materials, for reuse as lower carbon inputs for new products. A key component of the strategy also includes reducing carbon emissions from the most polluting industries, which the Amended Proposed Development would facilitate. Further detail is provided in ES Volume 1 Chapter 15, Climate Change, and ES Volume 1 Chapter 16 Sustainability. The approach prioritises BNG including through progressive restoration to facilitate creation of new habitat as soon as possible. Much will be in place and starting to mature prior to completion of the Amended Proposed Development.

Principle	In Practice	Justification
10. Be transparent	Communicate all Net Gain activities in a transparent and timely manner, sharing the learning with all stakeholders.	The BNG calculations and other information supporting it have been made available. The latest restoration plans that make up the BNG have been drawn up in discussion with NCC and NWT and such engagement would be expected to continue throughout the life of the Amended Proposed Development.

2.3 Assumptions

2.3.1 Phasing

The Department for Environment, Food & Rural Affairs (DEFRA) consultation on BNG[14], which closed in April 2022, stated that phased developments, such as this, would require flexibility to accommodate changes over time, particularly where development is delivered over a long period. The Amended Proposed Development is phased over an approximate 22-year period, with Site establishment followed by phased extraction and restoration.

This indicative net gain calculation has been produced to give an indication of net gain expected for the Main Operational Site (Area A). This net gain calculation provides an overview of how at least a 10% net gain could be achieved on Site. The calculations for each phase would be reviewed both to provide a net gain value accurate to conditions at the time of phase commencement (reflecting any required design changes, currently unknown due to the longevity of the construction phase) and at the end of the phase once the restoration works have been completed to confirm what has been implemented. Ongoing monitoring throughout and after the Amended Proposed Development will then confirm progress / achievement in line with the calculations.

The January 2022 guidance note[18] advises that on Site biodiversity net gains should be secured within 12 months of the commencement of development. Due to the phased nature of the project, and activities taking place on site, this is not possible.

The metric requires the delay in starting habitat creation (in years) to be incorporated to inform the calculations. Any habitat created within 12 months is allocated a zero delay in the metric. As this scenario is based on a 2-year delay, 1 is entered into the metric (the 12 months plus another 1-year delay) allowing for a total of just under two years for habitat creation to take place per habitat.

As the time frames for delivery of each phase are not confirmed, it is difficult to define delays accurately. The average phase length was calculated (21.4-year longevity/11 phases) as 1.95 years and this has been rounded up to 2 years. This assumes there is less than 2 years (the allowed period within 12 months plus the applied 1-year habitat creation delay) between the completion of PFA removal and habitat creation. This approach directly corresponds to the approach presented in the February 2023 version of the BMA included in the ES and enables a comparison of the percentage of net gain predicted to be delivered between the previous and Amended Indicative Landscape Restoration Plans.

However, it is recognised that this habitat creation delay will vary between phases, so the BNG has been calculated also using a grouping of the phases of the Amended Proposed Development, based on current estimates of the phase durations and the baseline habitats and restoration plans for each phase. Arguably this provides a more realistic estimate of the BNG and illustrates how large areas of habitat types such as woodland, that require longer time periods to achieve the better condition status

[14] Defra (2022) Consultation on Biodiversity Net Gain Regulations and Implementation. January 2022. Available at: Consultation on Biodiversity Net Gain Regulations and Implementation - Defra - Citizen Space (Accessed September 2023)

levels would be established in the early phases / groups. Where a habitat type is created across the footprint of multiple phases, and can only be created once the final phase of a group has been completed (e.g. the waterbody in phases LR P3, LR P4, LR P5 as part of Group 4), relevant delays are incorporated into the calculations for the first two phases in the group and the condition aim is the same across all phases as the pond will be built in one go, not across the three phases. Further details of the Metric calculations applying a phased grouping approach are set out in Section 3.5.

2.3.2 Post-Development

The Amended Proposed Development footprint for the purposes of the BNG assessment is shown in Figure 8.4.1, Appendix A and is restricted to Area A of the Amended Proposed Development only ("Areas" not shown on figure). Areas B and C are excluded from the calculations due to the temporary nature of the changes, as habitats will be returned to the baseline condition at the end of the Amended Proposed Development. Area B and C are dominated by cereal crops, non-cereal crops, developed land/sealed surface, modified grassland, built linear feature with a small area of other coniferous woodland and other broadleaved woodland. Any losses in habitat value in Areas B and C have not been quantified but, given the land area and habitat types present, would be small and are offset by the extensive restoration and gains within Area A.

The proposed wet grassland has been attributed to 'other neutral grassland' in the BNG assessment as it does not comply with conditions required for 'wetland – purple moor grass and rush pastures' or 'wetland – reedbeds'. Other neutral grassland was considered the most appropriate designation.

The proposed scrapes have been attributed to "Ponds – Non-Priority Habitat" as they are unlikely to meet the requirements of the UK Hab definition of Temporary lakes ponds and pools (H3170). H3170 temporary lake ponds and pools consist of winter-flooded areas, which dry out to give a vegetation rich in annuals (a majority of which are nationally rare species of southern European distribution). Only one site in the UK is known to contain significant areas of this habitat type.

Whilst mixed ash-dominated woodland was identified within the Nottinghamshire Local Biodiversity Action Plan (NLBAP), this was not considered as suitable planting for the woodland proposed on Site, due to the risk of ash die back leading to condition failure of this habitat type. Instead, a mixed species native woodland mix is proposed, which provides a more robust basis for achieving the desired condition for the created woodland.

The wet scrub areas have been attributed to 'Wet woodland' as the proposed habitat will be dominated by alder (*Alnus glutinosa*) and birch species (silver birch (*Betula pendula*) and downy birch (*Betula pubescens*)), with some hazel (*Corylus avellana*), grey poplar (*Populus canescens*), alder buckthorn (*Frangula alnus*) and various willows such as osier (*Salix viminalis*), eared willow (*Salix aurita),* grey willow *(Salix cinerea*) and goat willow (*Salix caprea*).

Woodland and Scrub are mapped together as 'Woodland/ Scrub'. The final habitat will be woodland (with understory), interspersed with scrub glades and ecotones. For the purposes of the metric the area was assumed to be 70% woodland, 30% scrub, but this will be confirmed in discussion with stakeholders.

One hedgerow on Site will be retained. This will be enhanced through tree planting to create a hedgerow with trees, providing a stronger feature for habitat connectivity along the northern Site boundary.

The proposed target conditions of neutral grassland and reedbeds were set to "good" with all other habitat creation proposed to meet "moderate" habitat condition[15], with the exception of bare ground,

[15] DEFRA consider that "*A newly created broadleaved woodland is likely to achieve 'poor' or 'moderate' condition during a 30-year BNG agreement, ring a 30-year BNG agreement, because of the time that trees take to grow."* Off-site BNG: what can you do after 30 years? - Land use: policies and framework (blog.gov.uk)

which will be created and managed to achieve a “poor” condition. Alignment with the criteria associated with the target conditions[16] will be monitored as part of the standard ongoing monitoring.

Due to the progressive approach to restoration, habitat management is likely to exceed the expected 30-year management period post development. Many of the early phases will be restored a long time before the final phase of the Amended Proposed Development is complete and given the time to achieve moderate / good condition for some of the habitat types in the later phases, it is expected that a period of approximately 25 years will be required post completion of the final phase. Some of the initial restoration will have been in place for approximately 20 years beforehand. The exact duration of the management will be determined by the findings of the ongoing monitoring of condition of the restored habitats and will be agreed with NCC.

2.3.3 Strategic Significance

Strategic significance score was allocated to habitats due to their location in proximity to the Sutton and Lound Gravel Pits Site of Special Scientific Interest (SSSI), the Sutton and Lound LWS, Nottinghamshire Priority Habitat and any other priority habitat types identified in the Nottinghamshire Minerals Local Plan. The following habitats were classed as ‘Formally identified in local strategy’ in the metric:

- Farmland: arable farmland (Cropland - Cereal crops in metric);
- Wet Grassland (within Other neutral grassland in metric);
- Wet woodland;
- Eutrophic and Mesotropic Standing Water (Ponds (non-priority habitat) and Reservoirs in metric);
- Reedbed;
- Ditches;
- Hedgerow; and
- Parkland and wood pasture (Individual trees - Rural tree).

2.4 On-Site Assessment

2.4.1 Baseline, Pre-construction Biodiversity Units

Baseline habitat information was taken from the most recent UKHab Survey (ESA, Volume 3, Technical Appendix 8.7: Updated Habitat Data). Habitat types on the Site comprised:

- Cropland - Cereal crops;
- Heathland and shrub - Mixed scrub;
- Grassland - Modified grassland;
- Grassland - Other neutral grassland;
- Woodland and forest - Other woodland; broadleaved;
- Woodland and forest - Other woodland; mixed;
- Urban - Artificial unvegetated, unsealed surface;
- Urban - Built linear features;
- Native hedgerow; and

[16] Natural England Biodiversity Metric 4.0- Technical Annex 1 - Condition Assessment Sheets and Methodology [Online] Available at: The Biodiversity Metric 4.0 - JP039 (naturalengland.org.uk) (Accessed September 2023)

- Line of trees.

The condition of the habitats was determined during the survey and the area, or length of habitats, were estimated using online mapping. Condition assessments are summarised in the UKHab, Habitat Condition, and PEA Update Survey Report[20] (detailed in Appendix Bof Technical Appendix 8.7, ESA Volume 3) and in the metric sheets (Appendix B and Appendix C of this report).

A baseline habitat map is presented in Appendix A, Figure 8.4.4 and the parcel numbers corresponding to the notes in the metric are presented in Appendix A, Figure 8.4.5.

2.4.2 Post Construction Biodiversity Units

Following construction, new habitats as stipulated in the Amended Indicative Landscape Restoration Plan (Appendix A, Figure 8.4.2) would be created. The masterplan provides an outline of the Site landscaping upon completion of the approximate 22-year phased approach. Habitats include:

- Pasture;
- Species rich grassland;
- Wet grassland;
- Advance planting;
- Woodland/scrub;
- Native species trees;
- Wet scrub;
- Reed beds;
- Standing water;
- Shallow pools;
- Ponds and scrapes;
- Ditches;
- Bridleway; and
- Footpaths.

The post development UKHab mapping is presented in Appendix A, Figure 8.4.6.

Habitat to be retained and enhanced include moderate condition native hedgerow that would be supplemented with tree planting. The hedgerow type would be enhanced to a Good condition native hedgerow with trees which has a higher distinctiveness value.

The list of habitats provided in the Metric 4.0 calculator are not all directly comparable with the habitats identified in the Site. As a result, professional judgement has been used to best match habitat types to those available within the Metric 4.0 calculator (Section 3.3.2). This follows the approach set out in the applicable guidance documents.

Habitat allocation and condition assessments are detailed above under the assumptions for post-development (Section 2.3.2) and Table 2.2 and Table 2.3. Opportunities would be taken to improve the target conditions if possible as part of the ongoing monitoring. For example, it may be possible to improve the condition of the bare ground under some bridleways and depending on exact planting times. Proposed habitat creation and enhancement would be delivered throughout the Amended Proposed Development and would be managed and monitored with reference to a subsequent habitat management and monitoring plan (HMMP) and be specific to each phase, or group of phases.

Table 2.2: Post Development Habitat Translations and Condition Assessments

Landscape reference	UKHab	Condition	Notes
Pasture	Modified grassland	Moderate	A bespoke mix of native grasses and red and white clover. The seed mix shall include six to eight vascular plant species per m^2 and the inclusion of at least two forbs to meet the essential criteria requirements to achieve Moderate condition for modified grassland. Management through seasonal grazing at appropriate stocking rates and manual removal of pernicious weeds as required will also enable the habitat to meet Moderate condition in managing bracken, the cover of scrub, invasive non-native plant species and the cover of bare ground.
Species rich grassland	Other neutral grassland	Good	Strip or inoculation seeding of typical hedgerow verge species. Using local provenance seed or 'Green Hay' transfers in either linear swathes or large scrapes (approximately 3 to 5 m^2). A varied sward height to be maintained with manual removal of pernicious weeds as required.
Wet grassland	Other neutral grassland	Moderate	All wet grassland to include parcels restored at a lower level than surrounding land, bounded by ditches and waterbodies, and created with an undulating profile to provide varying degrees of saturation. Other measures to encourage seasonal inundation will include scrapes and foot drains to provide some standing water and muddy edges to enhance foraging opportunities for bird species into spring.
Advance planting	Mixed scrub	Moderate	Trees and scrub lost during operation to facilitate soil storage, the conveyor corridor and embankment removal would be replaced with perimeter tree and native shrub planting.
Woodland/scrub	Other woodland; broadleaved / Mixed scrub	Moderate	Woodland and Scrub are mapped together as 'Woodland/ Scrub'. The final habitat would be woodland (with understory), interspersed with scrub glades and ecotones. As the distribution of woodland and scrub is currently undecided for the purposes of the metric the area was assumed to be 70% woodland, 30% scrub. Species to include field maple, alder, birch, hazel, crab apple, wild cherry, oak, goat willow, small-leaved lime, common oak, sessile oak, hazel, and hawthorn. The woodland should be managed through natural regeneration through thinning scarification and planting. The woodland would be protected from invasive grazing (including deer). Haloing would be undertaken to release potential future veteran trees.
Native species trees	Rural tree	Moderate	69 scattered trees (a mixture of whips and standards) to be planted on the species rich verge adjacent woodland in the west of the Site. Species to include common oak, sessile oak, hawthorn, hazel, holly, and alder.
Wet scrub	Wet woodland	Moderate	Wet scrub transitioning to drier scrub and grassland regeneration on the re-profiled bank. Includes some small clusters of ponds in the lower/flat area. Wet woodland habitat creation is identified in the Nottinghamshire Minerals Local Plan. To be established adjacent to the retained bank in the south of the Site.

Landscape reference	UKHab	Condition	Notes
Reedbeds	Reedbeds	Good	Reedbeds present around open waterbodies. Reedbeds would either be sown with locally sourced reed species seeds into saturated soil or directly planted into submerged soil. Reedbeds should be cut on a 5-year rotation with management of scrub to ensure an open structure is retained. Reedbed habitat creation is identified in the Nottinghamshire Minerals Local Plan.
Standing water Shallow pools	Reservoirs	Moderate	Open water, to be surrounded by shallower areas, reedbeds and wet meadow mix (area measurement includes standing water and attached shallow pools). Monitoring and management are required to maintain water quality. Vegetation on the water's edge should also be managed to prevent excessive shading. Water quality will be managed/ monitored.
Ponds Scrapes	Ponds (non-priority habitat)	Moderate	Ponds and scrapes adjacent ditch network (areas combined in metric). Up to three scrapes per hectare to be established.
Ditches	Ditches	Moderate	Water levels to be managed to ensure ditches do not dry out, an open aspect should also be maintained throughout habitat management and the watercourse should not be overshaded.
Bridleway	Bare Ground	Poor	Proposed tracks and footpaths throughout the Amended Proposed Development.
Footpaths	Bare Ground	Poor	Proposed tracks and footpaths throughout the Amended Proposed Development.

Table 2.3: Post Development Enhancements and Condition Assessments

Baseline Habitat	Change in Habitat	Condition Change	Notes
Native Hedgerow	Native Hedgerow with Trees	Good	Enhanced hedgerow with tree species including: Field Maple, Hawthorn, Hazel, Spindle, Holly, Honeysuckle, Wild Cherry, Dog Rose. To be scattered or group planted within species rich grassland areas. Good condition for hedgerows to be achieved through hedgerow management such as amendments to cutting regimes to allow the height and width of the hedges to be left to grow (further detail on target condition to be provided in a subsequent HMMP).

2.5 Phased Grouping Metric Scenario

In addition to the metric calculations applying an average 2-year delay in habitat creation, a phased grouping assessment was undertaken. The phases of the Amended Proposed Development were grouped together into five phase groups considered to have the same delay in habitat creation based on the amended restoration plan and estimated extraction duration. The habitat details pre and post development were then entered into five separate metric sheets to reflect the different delay in habitat creation for each group.

The condition elements of the phased metrics reflect the conditions identified in the overall 2-year approach (see Table 2.2). An exception was applied for the target condition of individual rural trees for Phase Group 3, which was reduced to Poor due to the delay in starting habitat creation of 14 years, resulting in the final time to target condition being in excess of the standard 30 years management period (40 years). This is a precautionary approach and the target condition of the habitats within each phase has the potential to be improved. The approach applied to the phase group metrics has not allowed for a management period greater than 30 years. For example, it could be argued that the habitats within group phase 1 will be managed for a greater period than those in group phase 5 and therefore have the opportunity to become more established and achieve a greater condition.

The phase groupings and habitat creation proposed within each group are outlined in Table 2.4 and Appendix A, Figure 8.4.3.

Table 2.4: Group phases, delay in habitat creation and proposed habitats.

Group phase	Group phase delay in habitat creation (years)	Phase	Phase delay in habitat creation (years)	Proposed Habitats (UKHab)
1	4	HR P1	4	Grassland – Modified grassland, Grassland – Other neutral grassland, Heathland and shrub – Mixed scrub, Woodland and forest – Other woodland; broadleaved, Individual trees – Rural tree, and Ditches.
2	2	HR P2	2	Grassland – Modified grassland, Grassland – Other neutral grassland, Woodland and forest – Wet woodland, Woodland and forest – Other woodland; broadleaved, Heathland and shrub – Mixed scrub and Ditches.
3	14	HR P3	2	Grassland – Modified grassland, Grassland – Other neutral grassland, Lakes – Ponds (non-priority habitat), Woodland and forest – Other woodland; broadleaved, Heathland and shrub – Mixed scrub, Individual trees – Rural tree, Native hedgerow with trees and Ditches.
		HR P4	5	
		HR P5	4	
		HR P6	4	
4	3	LR P3	1	Grassland – Other neutral grassland, Lakes – Reservoirs, Wetland – Reedbeds and Ditches.
		LR P4	2	
		LR P5	1	
5	1	LR P1 – Soakaway Ponds	1	Grassland – Other neutral grassland, Lakes – Reservoirs, Wetland – Reedbeds, Woodland

Group phase	Group phase delay in habitat creation (years)	Phase	Phase delay in habitat creation (years)	Proposed Habitats (UKHab)
		LP P2 – Filter Ponds	1	and forest – Other woodland; broadleaved and Ditches.

3. RESULTS

3.1 September 2023 Results: 2-year Delay in Habitat Creation

The Amended Proposed Development, as assessed by the BNG assessment, has achieved the following change in biodiversity units when an average two-year delay in habitat creation is applied, as shown in Table 3.1. The metric has shown there to be a 43.64% net gain in biodiversity habitat units on-Site.

The number of habitat units on-Site has increased from 558.56 to 802.30. There is also a 134.18% net gain in hedgerow units within the Site which have increased from 1.94 to 4.54. River units have also increased from 0 to 26.52. Due to the baseline river value of zero a percentage net gain value of 100% is automatically attributed.

Table 3.1: Quantifiable change in biodiversity units achieved by the Amended Proposed Development.

Biodiversity Units	Baseline Value	Post-Development Value	Change in Units	Outcome
Area-based Habitat Units	558.56	802.30	243.74	43.64%
Hedgerow Units	1.94	4.54	2.60	134.18%
River Units	0.00	26.52	26.52	100%

Version 4.0 of the metric contains a trading metric, that supports the delivery of LPA policy to protect priority habitats, through requiring 'like for like' habitat replacement for all high distinctiveness habitat types. Rule 3 of the metric is: "*Trading down' must be avoided. Losses of habitat are to be compensated for on a "like for like" or "like for better" basis. New or restored habitats should aim to achieve a higher distinctiveness and/or condition than those lost. Losses of irreplaceable or very high distinctiveness habitat cannot adequately be accounted for through the metric.".* All trading rules are met in the metric.

The Amended Proposed Development would secure measurable biodiversity net gain which broadly accords with national planning policy, as set out in Paragraph 170 of the NPPF, and Local Planning policy. This conclusion has been reached based on the Amended Indicative Landscape Restoration Plan (Appendix A, Figure 8.4.2). As discussed, due to the phased approach to Amended Proposed Development, individual net gain calculations would be reviewed prior to the commencement of each phase and on completion to reflect exact planting. These would accurately depict delays in habitat creation and additional species-specific habitat creation requirements, neither of which can be confirmed currently due to the long timescale of the Amended Proposed Development.

Full results produced by the Metric 4.0 calculator applying an average 2-year delay in habitat creation can be found in Appendix B of this report.

3.2 Group Phase Results: Variable Delay in Habitat Creation

The results of a group phase approach to assessing the potential to deliver BNG on Site are shown in Table 3.2 and in full in Appendix C. The results of this phase group assessment demonstrate the potential for the Amended Proposed Development to deliver significant net gains in the first two phases of work (HRP1 60.91% and HRP2 52.79%). Such 'front loading' of BNG delivery into earlier stages of the project align with the guidance indicated by DEFRA in the Consultation on Biodiversity Net Gain Regulation and Implementation[23] (January 2023) which states:

"*Biodiversity net gain delivery will be tracked on a phase-to-phase basis, including the target percentage gains to be delivered at each stage. For most phased developments, we intend to state in*

guidance that biodiversity gains should be 'frontloaded' into earlier stages. This will help to avoid the risk of net losses being caused by later stages being delayed or cancelled".

The trading rules are met in group phases 2, 4 and 5 however they are not met across group phases 1 and 3. In group phase 1, this is largely due to the loss of medium distinctiveness woodland to the west of the area to modified grassland. In group phase 3 this is largely due to the creation of modified grassland over areas that would previously have been woodland and scrub along the eastern boundary of the Site. When considered as a whole, as shown in Section 3.1, the Amended Proposed Development is delivering habitats that meet 'like for like' and 'like for better' BNG principles and creating local priority habitat types overall, including open water and ponds, reedbeds and grazed wet grassland suited to the Site conditions and in line with the Amended Indicative Landscape Restoration Plan.

Table 3.2: Group phases, delay in habitat creation and metric results.

Group phase	Phase	Group phase delay in habitat creation (years)	Metric outcome		
			Area	Hedgerow	Watercourse
1	HR P1	4	60.91%	N/A – no hedgerow in group phase	100%
2	HR P2	2	52.79%	N/A – no hedgerow in group phase	100%
3	HR P3, HR P4, HR P5, HR P6.	14	5.99%	87.36%	100%
4	LR P3, LR P4, LR P5	3	25.27%	N/A – no hedgerow in group phase	100%
5	LR P1 – Soakaway Ponds, LP P2 – Filter Ponds	1	17.97%	N/A – no hedgerow in group phase	100%

3.3 Comparison To February 2023 Iteration

A Site BMA was undertaken in February 2023 for the same development footprint applying the same 2-year delay in habitat creation and utilising the previous Biodiversity Metric 3.1 (published in April 2022). The results of the February 2023 BMA predicted a 12.66% net gain for habitats. The September 2023 assessment considers the changes to the indicative restoration plan following further stakeholder engagement and updated baseline survey results collected in June 2023 and shows a subsequent significant uplift in net gain at 43.64%.

The significant uplift predicted in BNG since the February 2023 iteration can be attributed to two key factors:

- The update to the Indicative Restoration Landscape Masterplan which included:
  - Reduced areas of open standing water at the eastern end of the Site, with more scalloped edges and shallower depths;
  - Reduced areas of native tree planting in the western edge of the Site and increased woodland / scrub planting along the southern edge;
  - Increased and broader areas of wet grassland and reduced areas of pasture.

- Scrapes included amongst the wet grassland that would be beneficial to amphibians, insects and other invertebrates;
- Areas of wet scrub along the southern edge of the Site; and
- Increased areas of species rich grassland at the western end of the Site; and

- An increase in target conditions for habitat creation. Such increases were considered achievable within the lifetime of the project based on a review of the Natural England condition assessment criteria.

4. SUMMARY

Through habitat creation and enhancement detailed in the ESA and the Indicative Restoration Landscape Masterplan (Appendix A, Figure 8.4.2), the Amended Proposed Development is predicted to deliver an overall net gain of 43.64% based on an average 2-year delay in habitat creation. This greatly exceeds the statutory requirement to provide a minimum 10% biodiversity net gain as stipulated by the Environment Act (2021). This restoration approach has been developed in discussion with key stakeholders including NCC and NWT. Ongoing engagement with NCC and other stakeholders will occur throughout the lifetime of the Amended Proposed Development and the habitat management.

An assessment of the BNG predicted to be delivered by the Amended Proposed Development when broken into five phased groupings also shows significant net gain (phase group 1: 60.91%, phase group 2: 52.79%, phase group 3: 5.99%, phase group 4: 25.27%, phase group 5: 17.97%). These gains may be more reflective of the achievable BNG given the progressive phased restoration approach. Individual calculations will be undertaken prior to the commencement of each phase to corroborate this value and provide updates when development design, restoration plans and potential additional constraints are more clearly defined. A subsequent HMMP will be developed and be specific to each phase, or group of phases, to outline the monitoring and management of these habitats including measures to monitor progress to achieve the target conditions required to provide the required net gain.

This BNG focuses on habitats alone. The ESA provides further consideration of the Amended Proposed Development's benefits for fauna and connectivity with surrounding habitats and networks of nature conservation value.

APPENDIX A FIGURES

Figure 8.4.1 – Site Area Plan

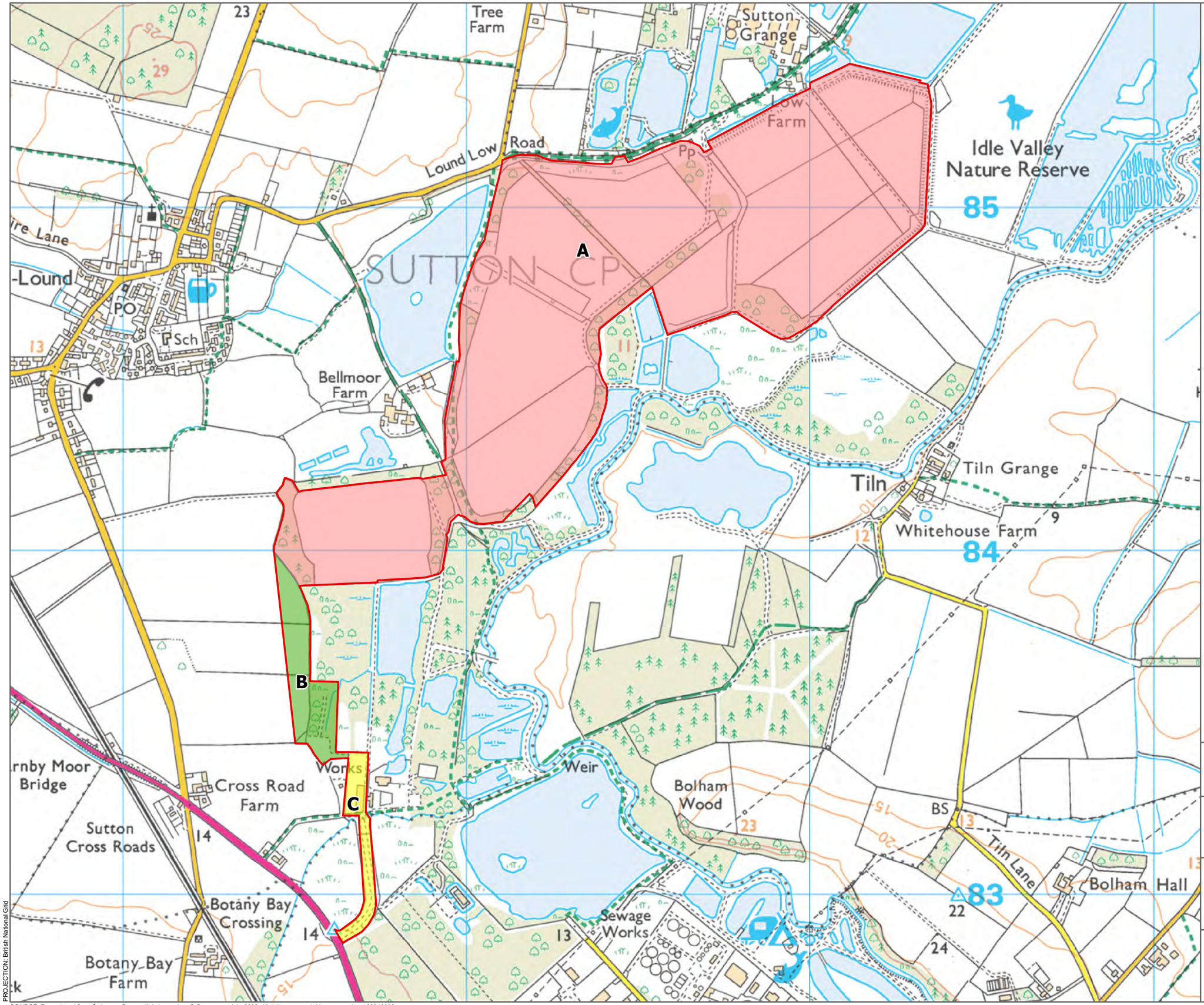
Figure 8.4.2 - Revised Indicative Landscape Restoration Plan

Figure 8.4.3 – Phase Groupings Plan

Figure 8.4.4 – Baseline UK Habitat Classification Map

Figure 8.4.5 – Baseline Parcel Numbers to support Metric Notes

Figure 8.4.6 - Restoration Plan in UK Habitat Classification



Site Boundary
A - Main Operational Site
B - Conveyor and Link Road
C - Temporary Optimisation Site / Main Processing Site

0 100 200 300 400
Metres

N

SCALE: 1:10,500	VERSION: V2
SIZE: A3	DRAWN: EB
REF: 4280-PUB-033	CHECKED: AC
DATE: 29/09/23	APPROVED:

Site Area Plan
Figure 8.4.1
Retford Circular Economy Project
ES Addendum Volume 3 Technical Appendix 8.4

ERM

HIVE AGGREGATES

PROJECTION: British National Grid

Path: Y:\GIS\Environment\4092 Lound Ash Extraction\4092 Lound Ash Extraction.aprx

N

DRAWING: 4092_DR_LAN_101-2

DRAWING: 4092_DR_LAN_101-1

Landform levels at the boundary will be in excess of 9.8 m AOD to alleviate flood risk

Potential Hide or Viewpoint Location

Proposed Permissive Way Access Gate

Sutton/BOAT7

Proposed NWT Access Gate

NWT Access Road

Sutton/FP1

Sutton/BW4

Sutton/FP5

Realigned Sutton/FP1

Sutton/FP5

Retained woodland within site boundary

Retained neutral grassland within site boundary

Retained embankments

Existing Gate to be Retained

Existing Gate to be Retained

Sutton/FP1

A

AA

B

BB

CC

D

DD

E

EE

0 50 100 150 200 250m
SCALE 1:2500

KEY **Note**

- Planning Application Boundary
- Existing Vegetation to be Retained
- Retained Woodland within Site Boundary
- Proposed Native Species Tree
- 7 Enhanced Hedgerow with Tree*
- 9 Proposed Woodland/Scrub*
- 10 Proposed Wet Scrub*
- Proposed Advance Planting
- 8 Proposed Pasture*
- 6 Proposed Species Rich Grassland*
- 4 Proposed wet grassland*
- 2 Proposed Reed Beds*
- Existing Waterbody
- 1 Proposed Shallow Pool*
- Proposed Standing Water
- Proposed Scrape (indicative location)
- 3 Proposed Ditch*
- Proposed Indicative Culvert Location (Where paths cross)
- Existing Track to be Retained
- Existing Public Rights of Way (Footpath)
- Existing Public Rights of Way (Bridleway)
- 14 Existing Retained Permissive Way*
- 13 Proposed Maintenance Access*
- 12 New Permissive Way*
- Existing Realigned Public Right of Way (Sutton/FP1)
- Sutton and Lound Gravel Pits SSSI
- 11 Proposed Indicative Interpretation Board Location*
- Proposed Maintenance Access Gate (Metal gate to control the access)
- Proposed NWT/Permissive Way Access Gate (Combination of kissing gate and metal gate)
- 5 Indicative Log Piles/Hibernacula Location*
- Potential Hide/Viewpoint Location

* Notes and numbered annotations refer to Drawing 4092_DR_LAN_101a

Site Boundary

Group Phase:

- Group 1 (HRP1)
- Group 2 (HRP2)
- Group 3 (HRP3, HRP4, HRP5, HRP6)
- Group 4 (LRP3, LRP4, LRP5)
- Group 5 (LRP1, LRP2)

0 50 100 150 200 250

Metres

N

SCALE: See Scale Bar	VERSION: A01
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REF: 0695864	CHECKED: KO
DATE: 26/09/2023	APPROVED:

Phase Groupings Plan
Figure 8.4.3
Retford Circular Economy Project
ES Addendum Volume 3 Technical Appendix 8.4

ERM

HIVE AGGREGATES

PROJECTION: British National Grid

Path: \\uksprdgisfs01\Data\London\Projects\0695864 - Lound Ash Extraction\MAPS\0695864 - Lound Ash Extraction\0695864 - Lound Ash Extraction.aprx

Site Boundary

UK Habitat Classification:

- c1c - cereal crops
- g3c - other neutral grassland
- g4 - modified grassland
- h3h - mixed scrub
- u1c - artificial unvegetated unsealed surface
- u1e - built linear features
- w1g - other woodland, broadleaved
- w1h - other woodland, mixed
- h2a - (priority habitat)
- w1h - other woodland, mixed
- w2c - other coniferous woodland

UK Habitat Secondary Codes	
Secondary Code	Description
10	Scattered scrub
11	Scattered trees
16	Tall herb
17	Ruderal/ ephemeral
36	Plantation
37	Semi-natural woodland
38	Secondary woodland
73	Bare ground

0 50 100 150 200 250

Metres

N

SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: DN
REF: 0695864	CHECKED: KO
DATE: 17/09/2023	APPROVED:

UK Habitat Classification Map
Figure 8.4.4
Retford Circular Economy Project
ES Addendum Volume 3 Technical Appendix 8.4

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HIVE AGGREGATES

PROJECTION: British National Grid

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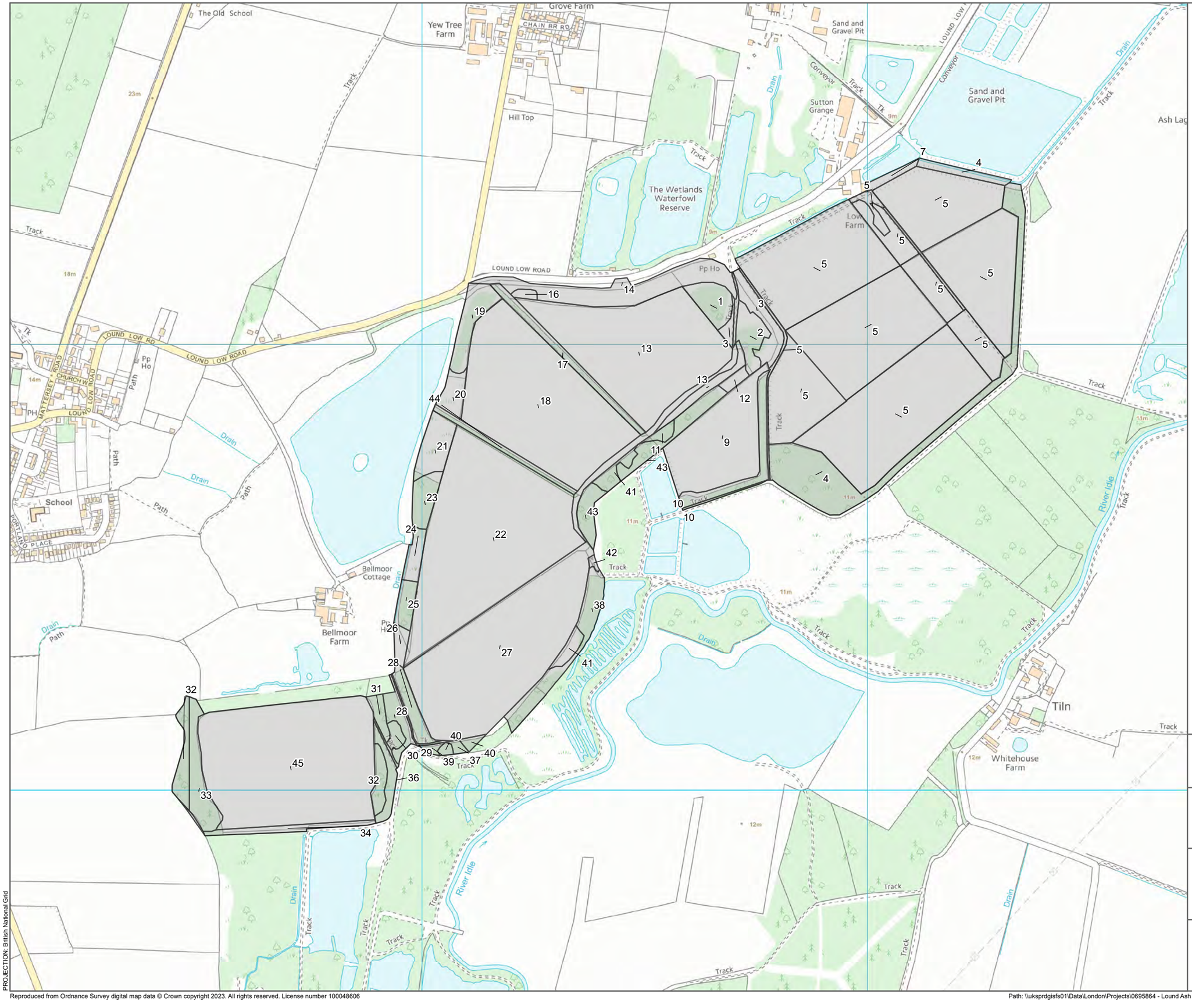

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DATE: 17/09/2023	APPROVED:

Parcel Numbers for Metric 4.0
Figure 8.4.5
Retford Circular Economy Project
ES Addendum Voume 3 Technical Appendix 8.4

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HIVE AGGREGATES

PROJECTION: British National Grid

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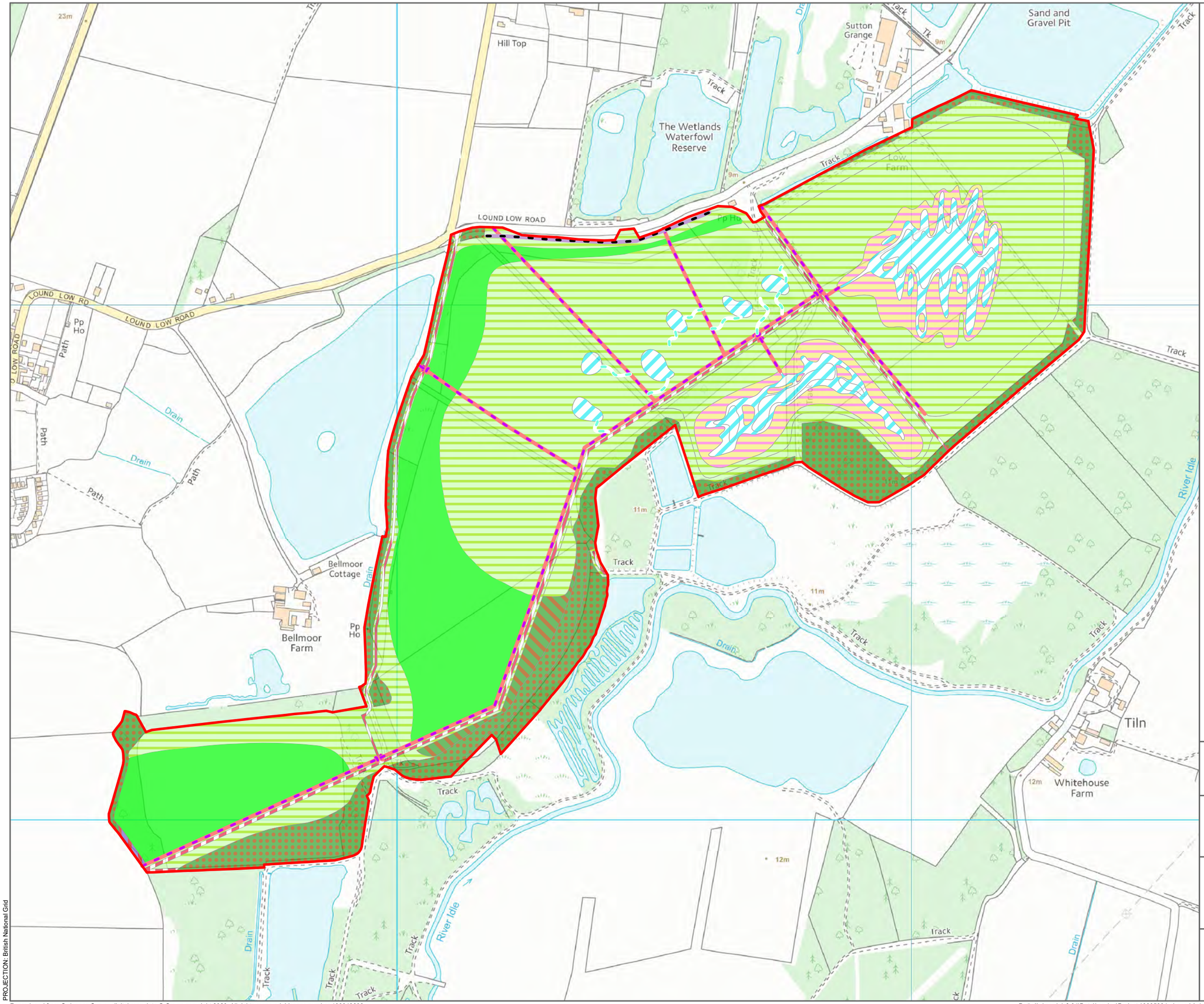

SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: DN
REF: 0695864	CHECKED: KO
DATE: 26/09/2023	APPROVED:

Landscape Mitigation Plan (UK Habitat)
Figure 8.4.6
Retford Circular Economy Project
ES Addendum Volume 3 Technical Appendix 8.4

PROJECTION: British National Grid

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APPENDIX B METRIC 4.0 SEPTEMBER 2023 RESULTS – 2-YEAR DELAY IN HABITAT CREATION

Please refer to the spreadsheet “RCEP_ESA_V3_TA8.4_Appendix B_NE_Metric4.0_2yrdelay.xlsm” submitted as part of this application.

APPENDIX C METRIC 4.0 SEPTEMBER 2023 RESULTS – PHASE GROUP AND DELAY IN HABITAT CREATION

Please refer to the following documents submitted as part of this application:

Phase Group 1 - RCEP_ESA_V3_TA8.4_Appendix C_NE_Metric4.0_PhasedGroup_1.xlsm

Phase Group 2 - RCEP_ESA_V3_TA8.4_Appendix C_NE_Metric4.0_PhasedGroup_2.xlsm

Phase Group 3 - RCEP_ESA_V3_TA8.4_Appendix C_NE_Metric4.0_PhasedGroup_3.xlsm

Phase Group 4 - RCEP_ESA_V3_TA8.4_Appendix C_NE_Metric4.0_PhasedGroup_4.xlsm

Phase Group 5 - RCEP_ESA_V3_TA8.4_Appendix C_NE_Metric4.0_PhasedGroup_5.xlsm

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