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BOW FARM FLOOD STORAGE COMPENSATION SCHEME

For

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CONTENTS

DRAWINGS

Drawing Number	Drawing Title	Version
BOWFHIA2411-1	Flood storage compensation scheme	a

BOW FARM FLOOD STORAGE COMPENSATION SCHEME

1. INTRODUCTION

GWP Consultants LLP (GWP) have been instructed by Moreton C Cullimore Group (MCCG) to prepare a response regarding flood storage compensation for the development at Bow Farm, operated by MCCG, as required under Planning Pre-Commencement Condition 19 of Planning Permission Number 19/000048/CM (Worcestershire County Council).

1.1 Pre-Commencement Condition Wording

The wording of Pre-Commencement Condition 19 of Planning Permission Number 19/000048/CM is provided below:

"Prior to the commencement of development hereby approved, a scheme for flood storage compensation including flood risk betterment (post scheme) and improvements to flood flow, in accordance with the approved 'Bow Farm Sand and Gravel Quarry Development Hydrogeological and Hydrological Impact Assessment and Flood Risk Assessment undertaken by GWP Consultants, Report Ref: 190714, Version v.02, dated 27 August 2019, including Appendix 13: 'Floodplain Storage Compensation Assessment' and accompanying drawing numbered: Appendix 13.1, Version B, Drawing Ref: BOWFHIA1907, shall be submitted to and approved in writing by the Mineral Planning Authority in consultation with the Environment Agency. Thereafter, the development shall be carried out in accordance with the approved scheme."

2. PREVIOUS APPROVED FLOODPLAIN STORAGE COMPENSATION ASSESSMENT

A *'Floodplain Storage Compensation Assessment'* was included as *Appendix 13* of the *'Bow Farm Sand and Gravel Quarry Development Hydrogeological and Hydrological Impact Assessment and Flood Risk Assessment'* report (HIA and FRA report – GWP Report No. 190714 v.02). The *'Floodplain Storage Compensation Assessment'* was subsequently approved through the granting of Planning Permission 19/000048/CM. This is acknowledged in the wording of Condition 19 of Planning Permission 19/000048/CM.

Therefore, the approved analysis remains valid. This report outlines the scheme for flood storage compensation at the site, including the principles behind the movements of soil stripped from areas on site and how flood storage betterment is provided through the scheme.

The 'worst case' scenario for flood compensation storage remains as outlined in the previous approved *'Floodplain Storage Compensation Assessment'*. This is considered to be after initial stripping of topsoil and subsoil, when all soil bunds are in place and excavation for the sand and gravel resource has not commenced. It is also assumed for this 'worst case' scenario that overburden has not been stripped in any of the areas.

3. FLOOD STORAGE COMPENSATION SCHEME

The flood storage compensation scheme will follow the process outlined below, starting prior to any works on site.

The components of the flood storage compensation scheme are illustrated on Drawing No. BOWFHIA2411-1. Drawing No. BOWFHIA2411-1 is an annotated version of previously approved Drawing No. BOWFHIA1907 App 13.1 submitted within *Appendix 13* of the HIA and FRA report.

1. The volume of soil to be stripped from below the 13.20mAOD floodplain level within Excavation Areas 1 and 2 is estimated to be *c.* 24,000m^3, as shown by the volumes in the *Appendix Table 13.4* of the HIA and FRA report. This estimated *c.* 24,000m^3 of soil will be stored above the floodplain in the temporary soil mounds located in the unexcavated Phases 3 to 8, as shown by the *"soil bund with toe above flood level"* features on Drawing No. BOWFHIA2411-1. This will ensure flood storage benefit from the start of operations.
2. An estimated 26,000m^3 of soil will be stripped from Flexible Working Area A (parts A1 and A2) and used to construct the perimeter bunds with their toe above the floodplain, shown by the *"soil bund with toe above flood level"* features on Drawing No. BOWFHIA2411-1. The total estimated 26,000m^3 of soil stripped from Flexible Working Area A (parts A1 and A2) will be from

below the floodplain, as demonstrated in *Appendix Table 13.4* of the HIA and FRA report. This provides additional flood storage benefit from the start of the operations.

3. The remaining sections of the bunds with the toe above the floodplain level will be completed using soils stripped from above the floodplain level from Excavation Areas 1 and 2. This is estimated to be *c.* 2,500m^3, calculated by taking the estimated soil volume of the *"bunds with toe above flood level"* from *Appendix Table 13.1 B.* of the HIA and FRA report (*c.* 28,500m^3) minus the estimated 26,000m^3 of soil available from Flexible Working Area A (parts A1 and A2) (see Stage 2. above) used to construct the above-floodplain bunds. This does not create a flood storage benefit, nor does it negatively impact on flood storage, as this stage involves taking soils from above the floodplain and placing it in bunds with the toe also above the floodplain.

4. An estimated 28,750m^3 of soils is required to construct the perimeter bunds with the toe below the floodplain, designated as *"soil bund with toe below flood level"* on Drawing No. BOWFHIA2411-1. Once the volume is adjusted for gaps to allow floodplain conveyance, only an estimated 7,500m^3 of the *c.* 28,750m^3 is below the flood level. These bunds will be constructed using soils from above the floodplain level from Excavation Areas 1 and 2 (estimated *c.* 10,700m^3 from *Appendix Table 13.4* of the HIA and FRA report), plus any additional soil required from the conveyor and stocking area (estimated *c.* 16,400m^3 from *Appendix Table 13.1 A.* of the HIA and FRA report) and *"Silt Pond 2"* and the *"clean water pond"* near the processing plant area (combined estimated *c.* 7,500m^3 from *Appendix Table 13.1 A.* of the HIA and FRA report). Only an estimated 1,500m^3 of soil is required to construct the bunds around *"Silt Pond 2"* and the *"clean water pond"* (*Appendix Table 13.3* of the HIA and FRA report), allowing more than enough spare soil to make up the remaining volume to complete the perimeter bunds with the toe below the floodplain. Despite placing *c.* 7,500m^3 of soil below the flood level, stripped from above the flood level, a net flood storage benefit is still realised at this stage – it is offset by the estimated 24,000m^3 (Stage 1.) and 26,000m^3 (Stage 2.) of soil taken from below the flood level and stored above the floodplain. These soil bunds will have open gaps incorporated making up 20% of the length of the bunds in the floodplain. This allows for the flow of flood waters through these gaps, where flood waters reach the bunds.

5. Any residual soils stripped will be stored in the temporary storage mounds above the *'active floodplain'* level.

6. The processing plant area in the east of the site will be stripped of topsoil and subsoil prior to the inclusion of the plant in this area. The stripped soils from the processing plant area will be used to construct perimeter bunds around the processing plant area, Silt Pond 1 and the clean water pond supplying the washing plant. Excess soil will be temporarily stored within the processing plant area. These areas are above the *'active floodplain'* level and so were disregarded in the previous *'Floodplain Storage Compensation Assessment' (Appendix 13* of the HIA and FRA report).

7. The areas of *"Silt Pond 2"* (now to be where the processing plant area surface water runoff attenuation pond and additional silt pond will be located) and the *"clean water pond"* will be stripped and this soil will be placed in edge protection bunds of a minimum height of 1.5m, or in the perimeter soil bunds. It is anticipated that these ponds will require edge protection bunds at least 1.5m high. A 1.5m high bund around the *"Silt Pond 2"* extent will be partly below the *'active floodplain'* level while around the *"clean water pond"* will be entirely below *the 'active floodplain'* level. An estimated 1,500m^3 of soil is required to construct the bunds around *"Silt Pond 2"* and the *"clean water pond"* (see Stage 4. above and *Appendix Table 13.3* of the HIA and FRA report).

8. As the works move southwards within Excavation Areas 1 to 9 the soils will be stripped from the next excavation phase areas. These soils will be used directly in the restoration of previous excavation areas or placed in the temporary mounds located above the *'active floodplain'* level *i.e.* in the *"preferred areas of temporary soil and overburden storage above flood level"* on Drawing No. BOWFHIA2411-1. These temporary soil mounds will be moved as necessary through the operation of the site. This ensures that soils stripped from Excavation Areas 1 to 9 which are not placed in the perimeter bunds, or used in the restoration of previously excavated phases, are kept in areas above the flood level.

9. As the extraction and restoration of Excavation Areas 1 to 9 progresses south, there will be mineral extraction undertaken within at least one excavation area, but often in more than one

of these areas at any one time. The excavated areas will provide more flood storage than is required by areas taken up by bunds constructed in the floodplain, as indicated by the positive storage volume balance of excavations by the horizontal *'slices'* within *Appendix Table 13.6* of the HIA and FRA report.

10. When an excavation area is close to being fully restored back to original ground level, the soils stored in the eastern perimeter bund within the footprint of the corresponding phase is placed back in that particular phase area. At the same time, the restoration infiltration basin feature will be progressively created in the west of restored Phases 1 to 9. The restoration infiltration basin will provide a flood storage benefit when the site is fully restored, as the rest of the approved restoration scheme allows for Phases 1 to 9 to be completed back to original ground levels. Flexible Working Areas A and B, located on the floodplain, will be restored to open water and wetlands using only site derived mineral waste (silts and clays) and will have a final landform below pre-extraction ground levels. Flexible Working Areas A and B therefore provide a flood storage benefit post-restoration.

4. BETTERMENT PROVIDED BY FLOOD STORAGE COMPENSATION SCHEME

By following the above stages in stripping soils and working/restoring Excavation Areas, a flood storage betterment will be provided through all stages of working. The initial soil stripping and placement creates this betterment, which is then continued through the following stages.

5. MONITORING

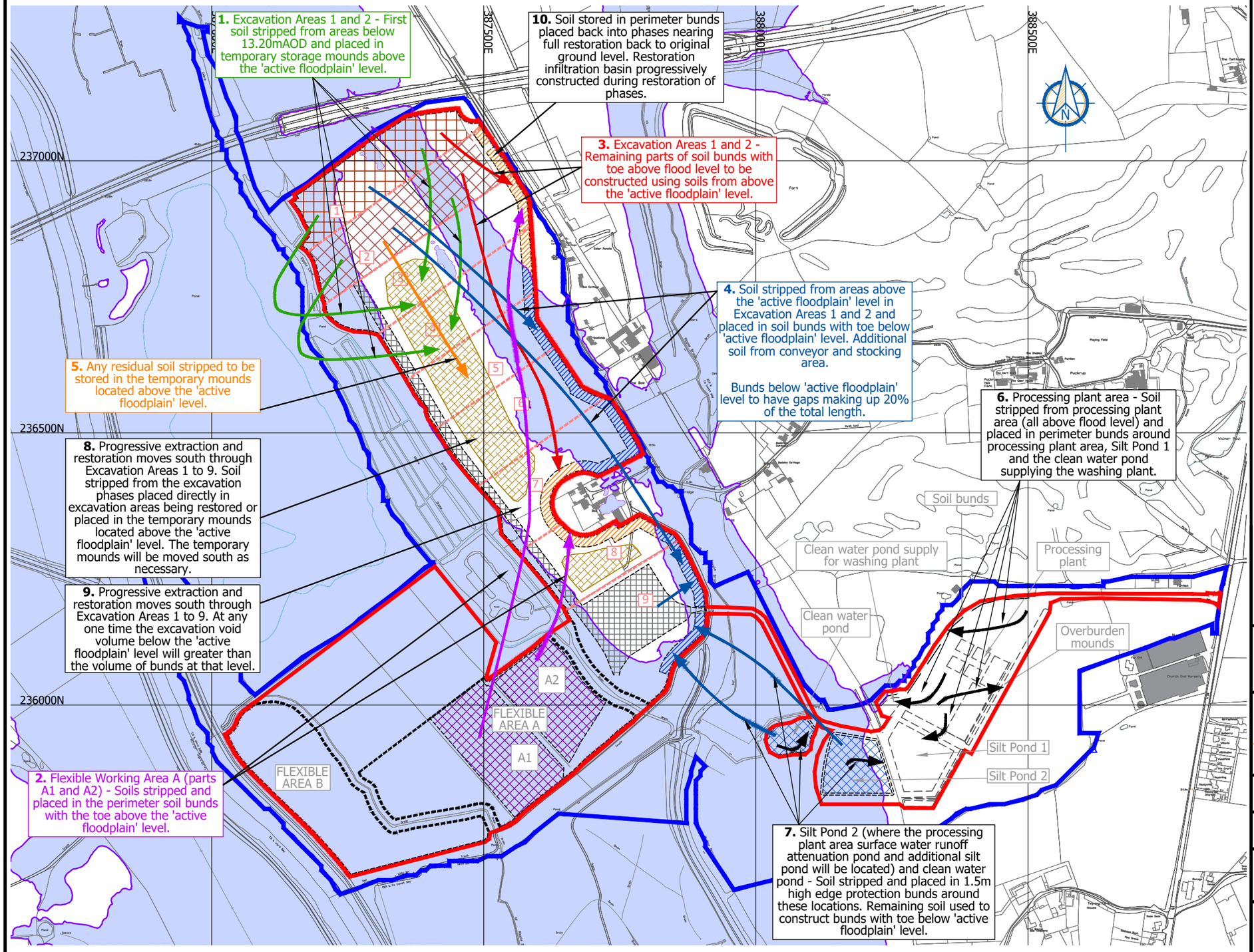
The regular operational surveys of the site, including excavations, bunds and stockpiles, will be used to undertake volumetric calculations in accordance with the approach used in *Appendix 13* of the HIA and FRA report, to determine the flood storage/loss balance in each *'slice'* to ensure compliance with this plan.

6. CONCLUSION

This report presents a Flood Storage Compensation Scheme for the approved development at Bow Farm, as required under Planning Pre-Commencement Condition 19 of Planning Permission Number 19/000048/CM (Worcestershire County Council).

The Flood Storage Compensation Scheme builds on the approved *'Floodplain Storage Compensation Assessment'* included within the HIA and FRA report (GWP Report No. 190714 v.02) by providing the principles behind the movements of soil stripped from areas on site and how flood storage betterment is provided by the scheme, throughout the life of the development.

GWP CONSULTANTS
NOVEMBER 2024



LEGEND

- Ownership boundary
- Application Site Boundary
- Proposed excavation limit (DJA Feb 2019)
- 6 — Excavation Areas
- Areas below flood level 13.19mAOD

Soil strip areas

- Excavation Area 1
- Excavation Area 2
- Conveyor and stocking area
- Partial strip of Flexible Excavation Area A

Soil bunds

- Soil bund with toe above flood level
- Soil bund with toe below flood level
- Preferred areas of temporary soil and overburden storage above flood level

NOTES

- Boundaries of excavation and soil strip areas from DJA Drawing 2636-4-4-2-1 DR0002 SP4-P2 (June 2018)

Version	Revision and compilation notes	Date
a	Issued	15.11.2024

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Moreton C Cullimore (Gravels) Limited

Project
Bow Farm: Flood Storage Compensation Scheme

Flood storage compensation scheme

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