Interchange 26

Residual Uncertainty Assessment

Curtins Ref: 065646-CUR-00-XX-RP-92001

Revision: V02

Issue Date: 15 May 2020

Client Name: Opus North

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Rev	Description	Issued by	Checked	Date
V01	First Issue	OT	MJS	18/12/2019
V02	Revised to suit new earthworks drawings	OT	OT	15/05/2020

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1.0 Project Background

As part of the planning submissions on the proposed development, Curtins have been appointed to provide a residual uncertainty assessment in order to discharge condition 23 in relation to the flood risk.

2.0 Site Location, Current Use and Development Proposals

2.1 Site Location

The proposed application area is located at the intersection of the M62 and M606 motorways (Junction 26), approximately 5.5 kilometres south of Bradford city centre in a local village area known as Oakenshaw. The site is accessed from Cliff Hollins Lane to the north via Oakenshaw village

The following OS based mapping in figure 1 shows the approximated location of the application area.

Figure 1. Ordnance Survey Location Plan

Approximate proposed locations shown outlined **RED**.

The northern boundary of the application area is formed by Cliff Hollins Lane and the existing site access road.

The eastern boundary of the application area is generally formed by the watercourse known as the Hunsworth Beck, although some of the application area does cross to the eastern banks (for precise application outlines refer to Architects redline plan).

The southern boundary of the application area is formed by the landscaped embankments of the M62 Motorway. The southern boundary has been curtailed at this point to allow for future improvement works to the M62/M606 junction.

The western boundary of the application area is formed by the landscaped embankments of the M606 motorway.

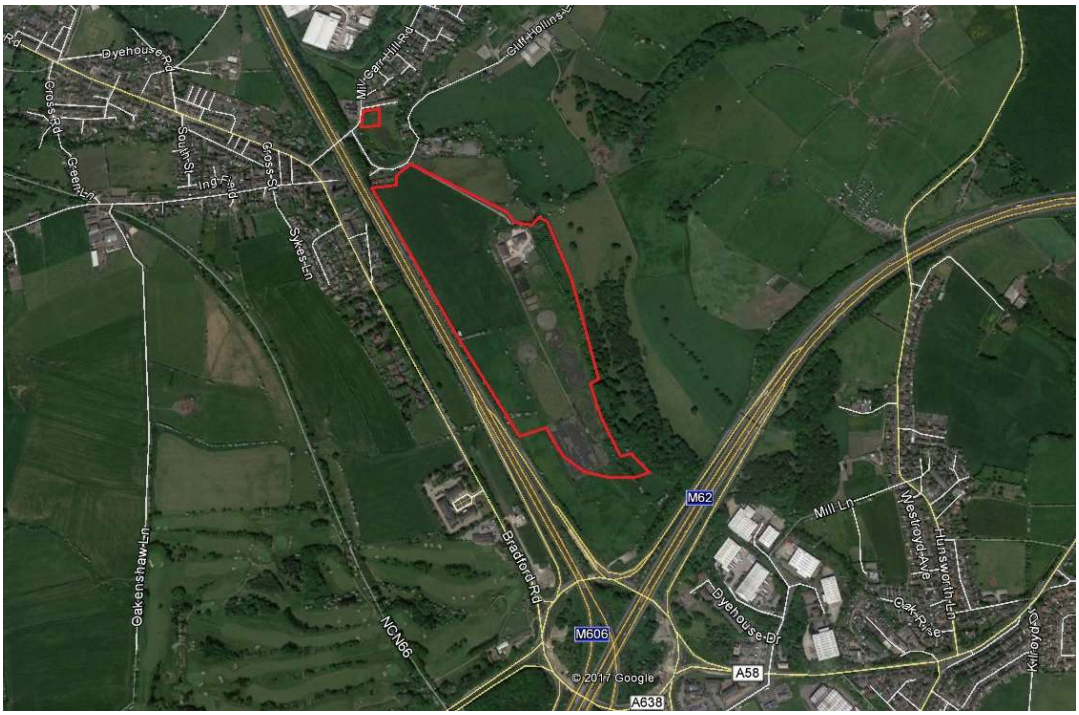
2.2 Current Use

The former waste water treatment works (WWTW) facility upon the site has been decommissioned for some time, with a new pumping station and transfer main in place to convey sewage onwards to a treatment facility south of the M62 motorway.

Remaining areas of the application area are undeveloped greenfield land some of which is currently farmed.

A GoogleEarth aerial photograph image is shown below in figure 2 showing the approximate area of land being studied (outlined red). The existing site access road from Cliff Hollins Lane can be seen as on the image, as well as the remaining filter beds and areas where demolition has taken place. The new transfer pumping station is located to the north of these redundant filter beds, and the large diameter transfer main runs along the eastern boundary adjacent to the Hunsworth Beck

Figure 2. GoogleEarth Aerial Photograph



Approximate proposed application area shown outlined **RED**

The WWTW site has an overall area of approximately 18 Hectares. The area of the proposed school car parking area to the north of the site access is approximately 0.12 Hectares.

2.3 Development Proposals

Development proposals for the WWTW site consist of commercial development of warehouse type industrial sheds.

The existing sewage transfer station and pipework will remain in place but all other remaining structures such as buildings and filter beds associated with the former WWTW will be demolished and removed to allow construction of the new development.

A new access road will be formed into the site off Cliff Hollins Lane to service the new commercial development areas and provide access to the remaining Yorkshire Water assets.

A new car park will be provided on land to the north for the adjacent school.

New foul and surface water drainage facilities will be provided to service the development. Areas of the new landscaping within the development will be needed to provide SuDS features for the new surface water drainage system.

3.0 Uncertainty Risk Matrix

As part of the current Environment Agency guidance consideration should be provided for all primary sources of uncertainty within the development in relation to flooding, the primary consideration are listed below;

- How appropriate is the flood risk analysis?
- How well is the flood plain modelled?
- How well has the potential for defence failure been modelled?
- What is the confidence in the hydrology?
- How good are the coastal/estuarine/tidal boundaries?
- How have the fluvial threats been represented?
- How have the coastal threats been represented?
- How has the surface runoff been represented?
- How have groundwater hazards been represented?
- What is strength of the evidence

A number of these considerations are not appropriate for this development as there are no recorded upstream flood defences and the water course is not tidal or in a coastal environment

Confidence		
Topic	Reliability	Score
How appropriate is the flood risk analysis?	There have been no changes since the evidence was created to represent the current situation well	1
How well is the flood plain modelled?	FRC undertook river modelling for the watercourse and included in-channel surveys within the model	1
What is the confidence in the hydrology?	Multiple gauging stations were used in the modelling and flows of up to the 1:1000 yr event have been calculated (see appendix a for 1:1000 flood levels)	1
How have the fluvial threats been represented?	In excess of 5 return periods were modelled using linked cross-sectional data	1
How has the surface runoff been represented?	In excess of 5 return periods were modelled using linked cross-sectional data	1
How have groundwater hazards been represented?	Historic ground water monitoring has been review alongside current on site ground water monitoring	1
What is strength of the evidence	Multiple flood events in excess of the design event	1

4.0 1:1000 Event Flood Levels

As part of the update to the flood risk assessment, updated 1:1000yr flood levels for the watercourse were obtained (see Appendix A for flood levels, Appendix B for Proposed earthworks levels)

For area adjacent to Unit 1 the 1:1000 water level is no more 95.78m AOD and for the Unit 4,5,6 Area is no more than 94.22mAOD

The floor levels for Unit 1 were constrained to a no less than 96.5m AOD and for the Units 4,5,6 area a minimum FFL of 95.5m AOD, however earthworks have dictated a level of 98.696m AOD for unit 1. This allows in all cases there will be dry evacuation routes from the site without crossing a flood risk area.

5.0 Appendices

Appendix A **Flood Level Modelling**

Appendix B **Earthworks Drawings**

Appendix A Flood Level Modelling

SURFACE LEVEL DATA			
NUMBER	MINIMUM LEVEL	MAXIMUM LEVEL	COLOUR
1	-10.00	-8.00	
2	-8.00	-6.00	
3	-6.00	-4.00	
4	-4.00	-2.00	
5	-2.00	0.00	
6	0.00	2.00	
7	2.00	4.00	
8	4.00	6.00	

Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
CUR-SUR-5.1_VolumeBuildings	1.000	1.000	33022.424sq.m	18799.040 Cu. M.	23056.418 Cu. M.	4257.379 Cu. M.<Fill>
CUR-SUR-5.2_VolumeHardstanding	1.000	1.000	36577.298sq.m	27329.496 Cu. M.	11435.124 Cu. M.	15894.372 Cu. M.<Cut>
Totals			69599.721sq.m	46128.536 Cu. M.	34491.542 Cu. M.	11636.994 Cu. M.<Cut>

Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
CUR-SUR-5.0_TopsoilStrip	1.000	1.000	47557.818sq.m	14267.345 Cu. M.	0.000 Cu. M.	14267.345 Cu. M.<Cut>
CUR-SUR-5.3_VolumeLandscaping	1.000	1.000	21736.800sq.m	21383.839 Cu. M.	4470.063 Cu. M.	16913.776 Cu. M.<Cut>
Totals			69294.618sq.m	35651.184 Cu. M.	4470.063 Cu. M.	31181.121 Cu. M.<Cut>
Fill to finish in landscape areas	1.000	1.000	21736.800sq.m	0.000 Cu. M.	6521.040 Cu. M.	6521.040 Cu. M.<Fill>

GENERAL NOTES:

1. THIS BULK EARTHWORKS ANALYSIS IS A COMPARISON BETWEEN THE STRIPPED ORIGINAL GROUND SURFACE, AND THE FORMATION SURFACE.
2. THE ANALYSIS IS BASED ON:
   - WARDELL ARMSTRONG, 2D TOPOGRAPHICAL SURVEY, DRAWING REF: SH10534-004, DATED 18/03/2014.
   - ELLIS HEALEY ARCHITECTURE PROPOSED SITE LAYOUT, DRAWING REF: 1656 SK04A, RECEIVED 13/01/2019.
3. ITEMS EXCLUDED FROM THIS ANALYSIS INCLUDE:
   - BULKING FACTORS
   - DEMOLITION ARISINGS FROM EXISTING BUILDINGS ABOVE GROUND LEVEL
   - EXCAVATIONS ARISING FROM THE DRAINAGE SYSTEM
   - SURFACE WATER ATTENUATION
   - BUILDING FOUNDATION EDGE BEAMS, PILES AND PILE CAPS
   - RETAINING AND NON-RETAINING WALL FOUNDATIONS
   - ADDITIONAL CAPPING REQUIREMENTS FOR PLANTING AREAS, IF REQUIRED.
4. ASSUMPTIONS:
   - ALL SITE MATERIAL IS ASSUMED TO BE REUSABLE
   - 300mm DEPTH OF TOPSOIL STRIP HAS BEEN ASSUMED, PENDING THE OUTCOME OF THE GROUND INVESTIGATION. THE CUT & FILL IS A COMPARISON BETWEEN THE TOPSOIL STRIPPED EXISTING SURFACE AND THE FORMATION SURFACE
5. ASSUMED FORMATION DEPTHS ARE:
   - 500mm BUILDING FOOTPRINTS
   - 450mm HARDSTANDING AREAS
   - 300mm LANDSCAPING AREAS
6. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
7. DO NOT SCALE FROM THIS DRAWING. ANY AMBIGUITIES, ERRORS OR OMISSIONS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
8. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
9. ALL AREAS ARE EXPRESSED IN SQUARE METRES.
10. ALL VOLUMES ARE EXPRESSED IN CUBIC METRES.

Rev:	Description:	Date:	By:	Chkd:
P01	ISSUED FOR INFORMATION.	22/01/19	AMB	OT

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Status: INFORMATION - S2

Project: NORTH BIERLEY WWTW REDEVELOPMENT

Drg Title: BULK EARTHWORKS ANALYSIS

Project No:	Size:	Date:	Drawn By:	Designed By:	Checked By:
060304	A1	22/01/2019	AMB	AMB	OT
	Scale: 1:1000				

Project Code: 060304 | Originator: CUR | Zone: 00 | Level: ZZ | Type: DR | Discipline: C | Category / Number: 91001 | Rev: P01

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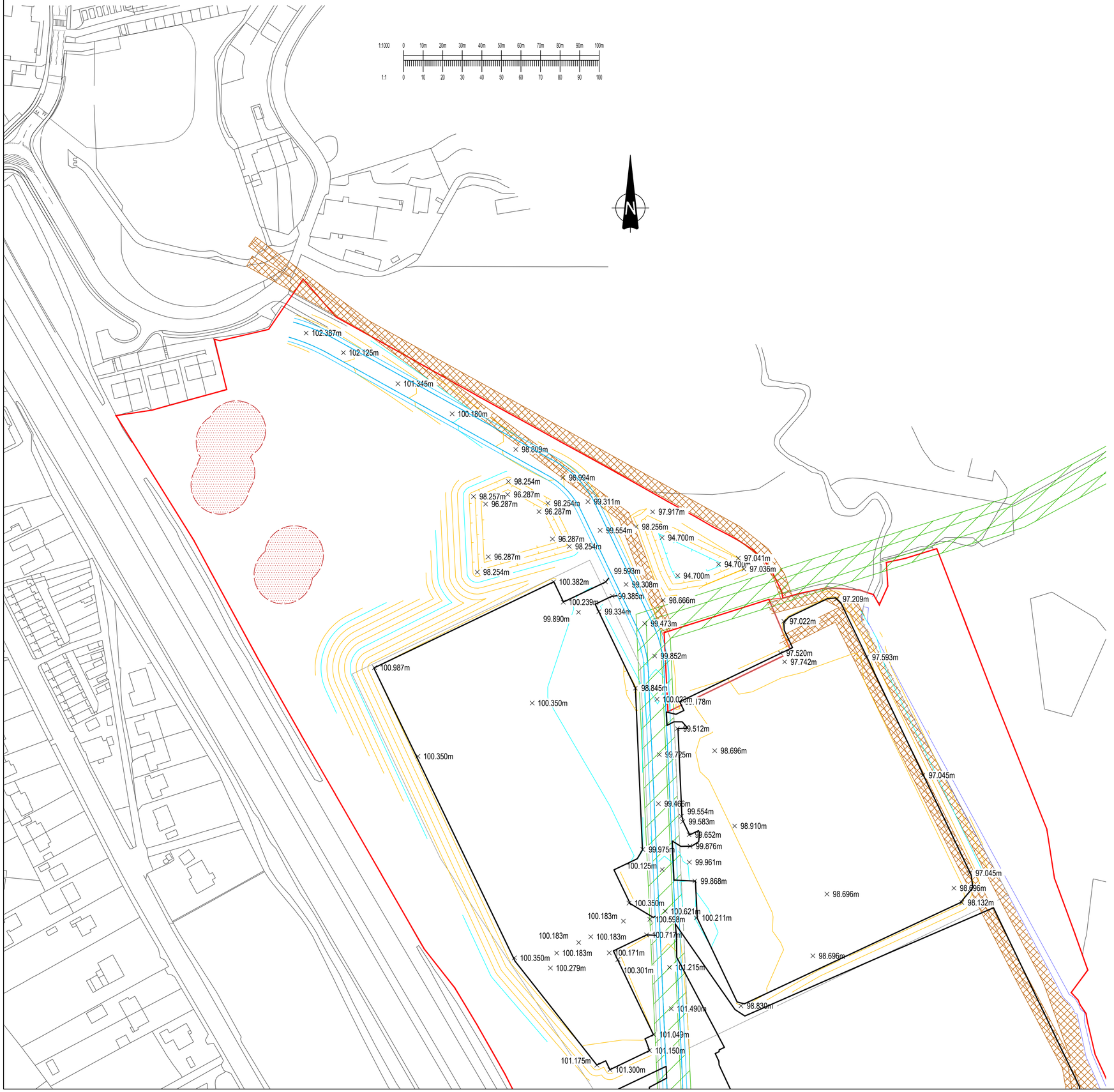
Appendix B Earthworks Drawings



GENERAL NOTES:

1. THE BULK EARTHWORKS ANALYSIS IS TO BE CARRIED OUT BY THE EARTHWORKS CONTRACTOR IN LINE WITH THE LEVELS INDICATED
2. THE LEVELS ARE BASED ON:
   - WARDELL ARMSTRONG, 2D TOPOGRAPHICAL SURVEY, DRAWING REF: SH10534-004, DATED 18/03/2014.
   - ELLIS HEALEY ARCHITECTURE PROPOSED SITE LAYOUT, DRAWING REF: 1856 PA101, RECEIVED 11/11/2019.
   - HTC ARCHITECTS PROPOSED SITE PLAN 2454 F404
   - 2m RESOLUTION DTM LIDAR DATA FROM THE ENVIRONMENT AGENCY
   - 30m RESOLUTION SRTMGL1 DATA
3. ASSUMPTIONS:
   - ALL SITE MATERIAL IS ASSUMED TO BE REUSABLE
   - 300mm DEPTH OF SITE STRIP HAS BEEN ASSUMED. THE CUT & FILL IS A COMPARISON BETWEEN THE STRIPPED EXISTING SURFACE AND THE FORMATION SURFACE, THE MAIN EXISTING HARD STANDING AREAS HAVE BEEN ACCOUNTED FOR WITHIN THE ENGINEERED FILL VOLUME CALCULAITONS
5. ASSUMED FORMATION DEPTHS ARE:
   - 500mm BUILDING FOOTPRINTS
   - 450mm HARDSTANDING AREAS
   - 300mm LANDSCAPING AREAS
     - PHASE 2 PLOT LEVELS ARE PROPOSED PLATEAU LEVELS, FURTHER WORKS TO FORM THE DEVELOPMENT ARE TO BE UNDERTAKEN AS PART OF THE PLOT CONTRACT WORKS
6. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
7. DO NOT SCALE FROM THIS DRAWING. ANY AMBIGUITIES, ERRORS OR OMISSIONS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
8. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
9. SOME BATTER SLOPES ARE LOCATED OUTSIDE THE FENCE LINE AND LIMITS OF TOPOGRAPHICAL SURVEY, RETAINING STRUCTURE MAY BE REQUIRED OR A REVISION TO THE EXTENTS OF THE WORKS
10. ALL BATTER SLOPES TO THE PLOTS ARE MODELED AT 1:3
11. THE LOWER BASIN HAS BEEN DESIGNED IN ACCORDANCE WITH THE YORKSHIRE WATER GUIDANCE FOR ADOPTABLE BASINS, SUBJECT TO DETAILED DRAINAGE DESIGN AND HYDRAULIC MODELLING. THE NORTHERN BASINS ARE PRIVATE AND HAVE BEEN DESIGNED AS 1:3 SLOPES WITH 300mm OF TOPSOIL OVER AM IMPERMEABLE MEMBRANE

Rev:	Description:	Date:	By:	Chkd:
P02	REVISED TO SHOW PLOT EXTENTS	14/05/20	OT	OT
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Project: NORTH BIERLEY WWTW REDEVELOPMENT

Drg Title: BULK EARTHWORKS LEVELS PHASE 1

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	12/05/20	OT	OT	OT
Scale: 1:1000				

Project No:	Originator:	Volume:	Level:	Type:	Role:	Category / Number:	Rev:
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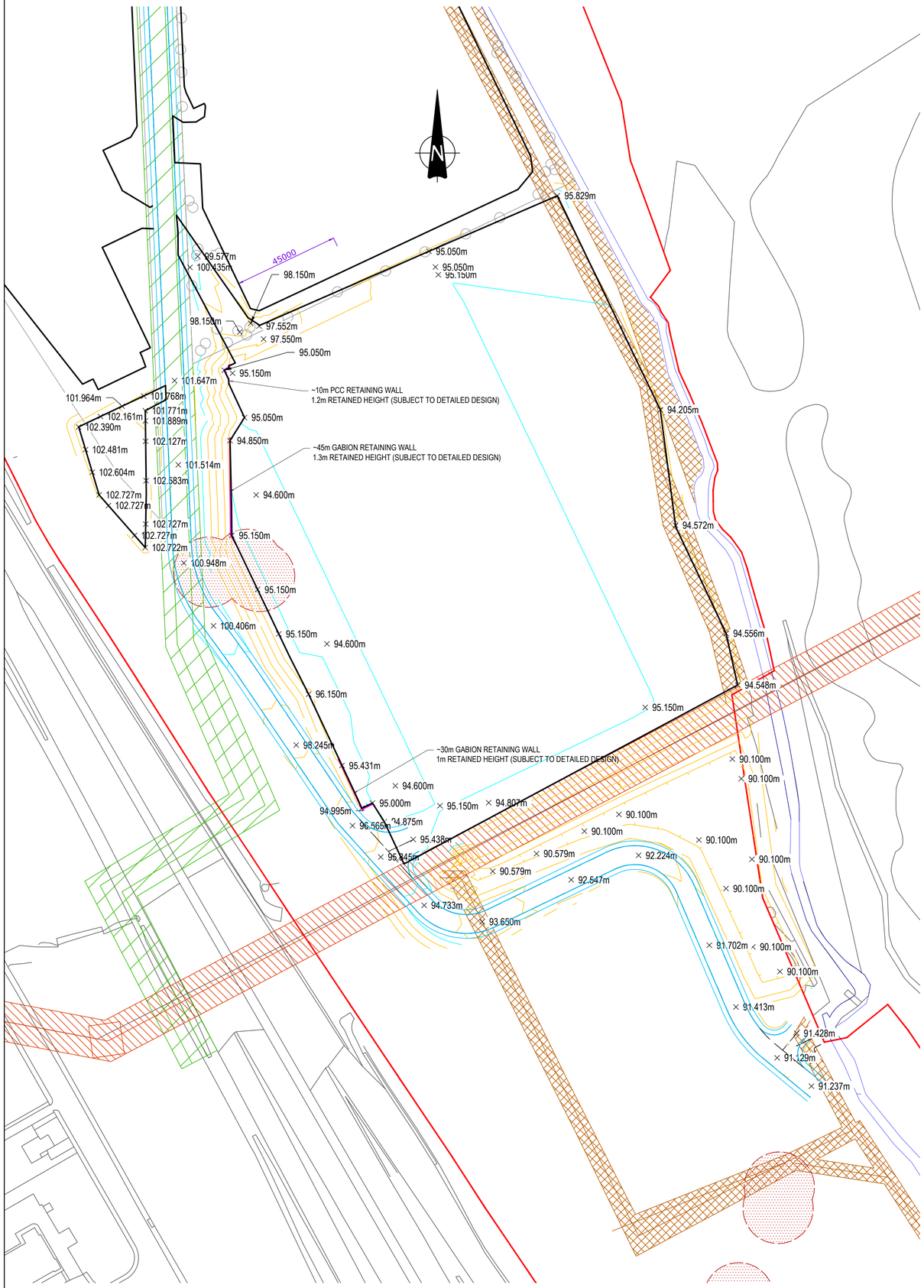

1:1000 0 10m 20m 30m 40m 50m 60m 70m 80m 90m 100m

1:1 0 10 20 30 40 50 60 70 80 90 100

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5. ASSUMED FORMATION DEPTHS (PHASE 2) ARE:
   - 350mm BUILDING FOOTPRINTS
   - 450mm HARDSTANDING AREAS
   - 650mm FIRE ACCESS ROUTE
   - PHASE 2 PLOT LEVELS ARE PROPOSED PLATEAU LEVELS, FURTHER WORKS TO FORM THE DEVELOPMENT ARE TO BE UNDERTAKEN AS PART OF THE PLOT CONTRACT WORKS
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Project: NORTH BIERLEY WWTW REDEVELOPMENT

Drg Title: BULK EARTHWORKS LEVELS PHASE 2

Size:	Date:	Drawn By:	Designed By:	Checked By:
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Scale: 1:1000

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