ENVIRONMENTAL STATEMENT

VOLUME 2

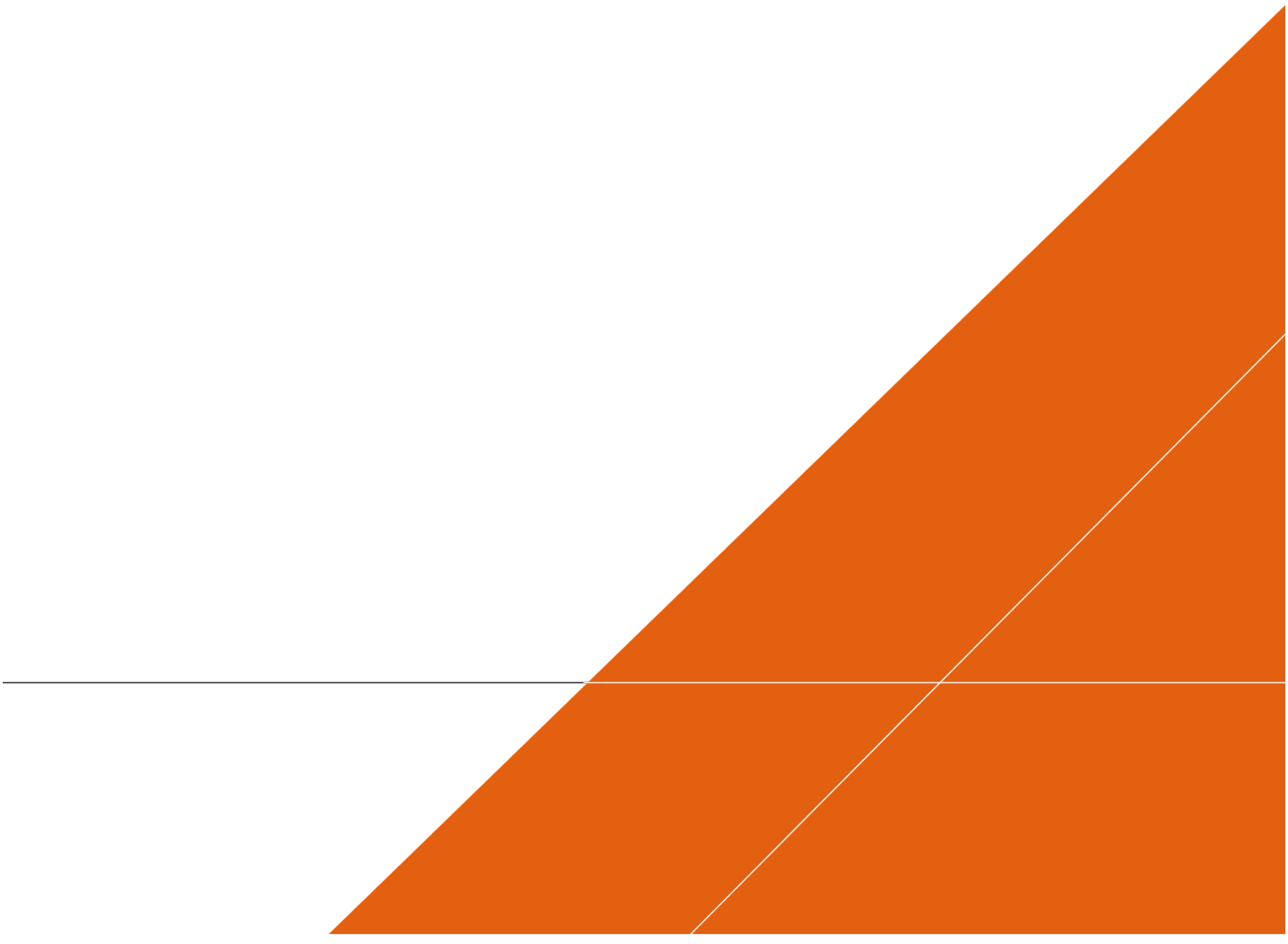
APPENDIX 4.2 – OUTLINE CONSTRUCTION PROGRAMME

ARCADIS Design & Consultancy for natural and built assets

PROPOSED GREAT WOLF LODGE CHESTERTON, BICESTER

Outline Construction Programme

NOVEMBER 2019



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VERSION CONTROL

Version	Date	Author	Checker	Approver	Changes
A	13.09.19	Chris Watson	Timir Patel	Timir Patel	
B	26.09.19	Chris Watson	Timir Patel	Timir Patel	Minor changes made
C	01.11.19	Chris Watson	Timir Patel	Timir Patel	Final review

CONTENTS

1 Introduction

This document provides Construction Methodology and Programme of Works for the development of Great Wolf Lodge ('the proposed development') on part of the existing golf course at Bicester Hotel Golf and Spa, Chesterton, Bicester, Oxfordshire.

The scheme comprises the reconfiguration of the existing golf course (back nine) for the inclusion of the hotel, leisure facilities and associated car parking. The existing hotel (and leisure / spa facilities) and the front nine holes will remain.

This document provides details of how we envisage construction of the works will proceed in the relevant sequence all of which is supported by the programme contained under Appendix A.

2 Programme Assumptions

The construction works will commence with setting out ahead of undertaking the reduced level excavation. Due to the extent of area this will most likely be undertaken using heavy excavation equipment such as a Grader/ bulldozer to form spoil heaps which will then be loaded into tipper wagons using 360 excavators and relocated/ transported off site. Once the appropriate levels are achieved the piling mat will be imported across the site again using tipper wagons and excavation equipment to roughly level the area ahead of compacting with a vibrating roller.

A dewatering strategy and equipment will be employed across the site to account for the existing water table (circa 250mm below ground level) during the excavation and piling activities and until the ground floor structure is erected. Some elements of this strategy may remain in place until the permanent drainage is installed, however, this is subject to the build-up of external finishes.

As the piling mat becomes established piling rigs will be delivered to undertake the bored piles, we have assumed up to twelve rigs on site. Pile caps will be excavated and cast thereafter along with installing any under-slab drainage and service ducts before setting up the formation level and pouring the ground floor slab areas. Once suitable areas of ground floor slab are available the superstructure frame will commence based on a mixture of concrete and steelwork. With regards to cranage for the Accommodation wing, the Family Entertainment Centre (FEC) and the Waterpark (WP) the most suitable cranage requirements for the erection of the various elements and parts of the project will be considered with the Main Contractor.

The envelope construction is based on a Structural Frame System (SFS) with prefabricated brick slip panels and windows, we expect this to be installed using a mixture of external scaffolds and mast climbers. Roof panels will be distributed using suitable cranes and accessed from the same mast climber and scaffold arrangement.

As areas become weathertight fit out works will commence across the differing building areas across the development. We anticipate up to 4Nr twin goods/ passenger hoists for the accommodation block. As the FEC and Waterpark areas are single storey it is unlikely they will require external hoist access, although machinery including forklifts, access platforms and cherry pickers will be used to access the double height areas internally

External works will be conducted using similar excavation and compaction equipment, with forklifts distributing materials across the areas. Access roads and parking areas are to be tarmac covered and this will be undertaken using an asphalt paver and compact roller ahead of applying road markings.

3 Programme Outputs for Groundworks and Superstructure Concrete

Below we have identified the typical programme output for the groundworks and the concrete works associated with the superstructure

- Excavation; Up to 925m3 per day
- Imported fill; Up to 415m3 per day
- Piles; 5Nr per rig day
- Concrete slabs; 500m2 per week (per area).

4 Delivery Expectations

In order to fully appreciate the number of deliveries we need to fully understand the quantum of works which will influence this. As such we will need to first establish a potential average across the on-site duration and then delve deeper to understand the potential peaks and troughs during the construction period. The overall quantum of work appears to include;

4.1 Reduced Level Excavation

Without the benefit of a precise cut and fill exercise we have looked to make an assumption that removing 2m of earth across the site will encompass all made ground and take the site to below the 650mm deep piling mat level, which would result in the following;

25,408m2 x 2m = 50,816m3 / 15m3 = 3,388Nr wagon loads

4.2 Piling Mat

We have assumed the piling mat will be 650mm deep, therefore;

25,408m2 x 0.65m = 16,516m3 / 15m3 = 1,102Nr wagon loads +25% perimeter crane hard standings and compaction (4,129m3) = 20,645m3/ 15m3 = 1,377Nr wagon loads

4.3 Piling

a. Accommodation areas

Typically show 14Nr piles across an area of 47.88m2, based on 450mm diameter and 12m deep. With pile caps 1m deep and approx. 16m3 per area of 47.88m2. Therefore;

Pile numbers = 1,775Nr based on a typical floor area of 6,066m2

Pile Arisings = 1,775 x (12 x 0.45) = 9,585m3/ 15m3 = 639Nr loads

Concrete piles = 9,858m3/ 6m3 = 1598Nr loads

Pile Cap Arisings = 6,066m2/ 47.88m2 = 127Nr x 16m3 = 2,032m3/ 15m3 = 136Nr loads

Concrete Pile Caps = 127Nr x 16m3 = 2032m3/ 6m3 = 339Nr loads

Excavation total – 775Nr loads; Concrete total – 1937Nr loads

b. FEC areas (BoH/ FoH)

Typically show 28Nr piles across an area of 225m2, based on 450mm diameter and 12m deep. With pile caps 1m deep and approx. 17.5m3 per area of 225m2. Therefore;

Floor Area = 14,229m2 – (6,066m2 – 4,338m2) = 12,501m2/ 225m2 = 56Nr

Pile numbers = 56 x 28= 1,568Nr

Pile Arisings = 1,568 x (12 x 0.45) = 8,468m3/ 15m3 = 565Nr loads

Concrete piles = 8,468m3/ 6m3 = 1412Nr loads

Pile Cap Arisings = 56Nr x 17.5m3 = 980m3/ 15m3 = 66Nr loads

Concrete Pile Caps = 56Nr x 17.5m3 = 980m3/ 6m3 = 164Nr loads

Excavation total – 631Nr loads; Concrete total – 1576Nr loads

c. Waterpark areas

Typically show 72Nr piles across an area of 900m2, based on 450mm diameter and 12m deep. With pile caps 1m deep and approx. 35m3 per area of 900m2. Therefore;

Floor Area = 7,198m2/ 900m2 = 8Nr

Pile numbers = 8 x 72= 576Nr

Pile Arisings = 576 x (12 x 0.45) = 3,111m3/ 15m3 = 208Nr loads

Concrete piles = 3,111m3/ 6m3 = 519Nr loads

Pile Cap Arisings = 8Nr x 35m3 = 280m3/ 15m3 = 19Nr loads

Concrete Pile Caps = 8Nr x 35m3 = 280m 3/ 6m3 = 47Nr loads

Excavation total – 227Nr loads; Concrete total – 566Nr loads

4.4 Basement Excavation

These works consider the basement bunker and pool areas associated with the Waterpark building

Bunker Building – 871m2 x 5m = 4,355m3/ 15m3 = 291Nr loads

Pool works – 287m2 x 1.5m = 403.5 + 1,901m3 = 2,331.5m3/ 15m3 = 156Nr loads

Total loads 447Nr

4.5 Ground Floor Concrete Slab

The ground floor slab to all areas of the development are noted as follows:

Accommodation – 6,066m2 x 0.3m = 1820m3/ 6m3 – 304Nr loads

FEC – 12,501m2 x 0.3m = 3751m3/ 6m3 = 626Nr loads

Waterpark – 7,198m2 x 0.3m = 2160/ 6m3 = 360Nr loads

E/o Pool Walls say 300m3/ 6m3 = 50Nr loads

Total loads 1040Nr

4.6 Substructure Totals

The total loads for the substructure works are noted as follows:

- Excavation – 3,338Nr + 775Nr + 631Nr + 227Nr + 447Nr = 5,418Nr loads
- Concrete – 1,937Nr + 1,576Nr + 566Nr + 1,040Nr = 5,119Nr loads

- Reinforcement – Say 25% of concrete; 5,119 x 25% = 1,280Nr Loads
- Piling mat – 1,377Nr loads

Overall loads = 13,194Nr loads

4.7 Superstructure

4.7.1 Concrete slabs

Accommodation – 6,066m2 x 0.3m = 1,820m3/ 6m3 – 304Nr loads x 4 levels = 1216Nr loads

Reinforcement & decking – say 25% of concrete; 1216 x 25% = 304Nr loads

Total loads 1,520Nr Loads

4.7.2 Steelwork

Allowance 1 tonne per m2 based onloads of 30 tonnes

Accommodation = 6,066 tonnes/ 30 = 203 Nr Loads

FEC = 12,501 tonnes/ 30 = 417Nr Loads

Waterpark = 7,198 tonnes/ 30 tonnes = 240Nr loads

Total Structural Steelwork 203 + 417 + 240 = 860Nr Loads

5 Delivery Numbers

Overall number of substructure & superstructure frame loads equates to 13194 + 1520 + 860 = 15,574.

Therefore, if we have assumed that the envelope and fit out will produce the same amount of deliveries including waste removal as substructure and frame, equating to approx. 31,150 deliveries overall.

As such if we divide this by the number of working days per year (240 days) based on an overall programme of 24 months (480 working days) we see an average of 65 deliveries per day which when considered over an 8 hour day equates to 8 deliveries per hour (1 delivery every 7 minutes); or when split over up to 3 delivery/ site locations across the site this becomes approx. 2- 3 deliveries per hour.

5.1 Delivery Peak

Based on the programme output the initial peak will involve earthworks, piling mat and commencement of piling to the accommodation wings. Based on typical outputs of;

- Excavation 925m3 per day
- Piling mat 415m3 per day
- Piling 5 piles per rig day (using 6Nr rigs) 162m3 per day (excavation and reinforced concrete)

This initial peak will therefore be;

- Excavation 62Nr loads per day
- Pile Mat 28Nr loads per day
- Piling 36Nr loads per day

Overall 126Nr loads per day; say 130Nr

During Substructure works associated with Accommodation FEC and Waterpark this becomes;

Accommodation Wings

Piling – 27m3/ Rig day x 6 Rigs = 162m3/ 15m3 = 11 Loads spoil; 108/ 6m3 = 20 Loads concrete (+ 25% Reinforcement) = 25 Loads; 36 Loads overall per day

Pile caps – 2,032m3/ 50 days = 40.7m3 per day / 15m3 = 3 loads spoil; 19.6m3/ 6m3 = 7 loads concrete + 25% RF = 9 loads; 12 loads overall

GF Slab – 500m2 per week/ 5 days = 100m2 x 0.3m = 30m3/ 6m3 = 5 loads (+25% RF) = 6.25 loads

Overall 36 + 12 + 6 = 54 loads

FEC Area

Piling – 27m3/ Rig day x 4 Rigs = 108m3/ 15m3 = 8 Loads spoil; 108/ 6m3 = 18 Loads concrete (+ 25% Reinforcement) = 23 Loads; 31 Loads overall per day

Pile caps – 980m3/ 85 days = 11.6m3 per day / 15m3 = 1 load spoil; 11.6m3/ 6m3 = 2 loads concrete + 25% RF = 2.5 loads; 7 loads overall

GF Slab – 500m2 per week/ 5 days = 100m2 x 0.3m = 30m3/ 6m3 = 5 loads (+25% RF) = 6.25 loads

Overall 31 + 7 + 6 = 44 loads

Waterpark

Piling – 27m3/ Rig day x 2 Rig = 54m3/ 15m3 = 4 Loads spoil; 54/ 6m3 = 9 Loads concrete (+ 25% Reinforcement) = 11.25 Loads; 21 Loads overall per day

Pile caps – 280m3/ 60 days = 4.7m3 per day / 15m3 = 0.33 loads spoil; 4.7m3/ 6m3 = 0.8 loads concrete + 25% RF = 1 load; 2 loads overall

Basement/ Pool Excavation – 6,666.5m3/ 35 days = 190.5m3 per Day/ 15m3 = 13 Loads spoil

Overall = 11 + 2 + 13 = 26 loads per day

Combine substructure Accommodation, FEC & Waterpark

54 + 44 + 26 = 124 loads per day

5.2 Delivery Range

Based on the above we would suggest the following delivery movements are anticipated across the project duration;

- Enabling; 10 – 130Nr Loads per day
- Substructure works; 60 – 130Nr loads per day
- Superstructure/ Envelope Works; 40 – 80Nr loads per day
- Fit Out; 10 – 65Nr Loads per day

These numbers may reduce if excavated material is retained/ reused on site to circa;

- Enabling; 10 – 80Nr Loads per day
- Substructure works; 60 – 130Nr loads per day

The numbers across superstructure and fit out could reduce significantly (approx. 50%) if modular units are used for the accommodation block;

- Superstructure/ Envelope Works; 20 – 40Nr loads per day
- Fit Out; 10 – 30Nr Loads per day

5.3 Delivery Vehicles

We anticipate the following vehicles will be undertaking deliveries to and from site during these periods;

- Tipper wagon (approx. 15m3)
- Concrete wagon (approx. 6m3)
- Skip Wagon
- HGV with flatbed trailer (approx. 30- 40t)
- HGV with curtained trailer (approx. 30- 40t)
- Rigid trucks
- Vans

5.4 Plant & Machinery

Other plant machinery would include;

- Grading excavator/ Bulldozer
- 360 Excavator
- Compact roller
- Piling rig
- Mobile or tower crane
- Concrete pump
- Mast climbers
- Forklift
- Goods Hoist
- Access platform/ cherry picker
- Asphalt paver

5.5 Construction Operatives

Although the number of Construction operatives on-site cannot be ascertained prior to appointment of a Principal Contractor and their Sub-Contractors, we are assuming the following average number of operatives will be present on site during the listed phases:

- Enabling; **10 - 50 Men on site**
- Substructure; **50 - 100 Men on Site**
- Superstructure & Envelope; **100 - 150 Men on Site**
- Envelope & Fit Out; **150 - 400 Men on Site**

In order to minimise the number of operatives' journeys to site, we would expect the Principal Contractor to considering utilising a shuttle bus from the local train station. The proposed times of a shuttle bus service can be timed around peak rush hour; however, this will be further clarified in the Construction Management Plan as it is developed.

Conclusion

Based on the above we would envisage that the delivery ranges will include;

- Enabling; 10 – 130Nr Loads per day
- Substructure works; 60 – 130Nr loads per day
- Superstructure/ Envelope Works; 40 – 80Nr loads per day
- Fit Out; 10 – 65Nr Loads per day

The level of design information currently available for this project means these figures are undoubtedly subjective, while we have looked to focus on the key activities which can be measured or defined, we have not recorded outputs against all programme activities. Elements such as;

- Below slab drainage and services
- External works including parking areas and landscaping
- Temporary site access roads and site accommodation/ welfare areas
- Secant and sheet piles
- Machinery deliveries

  have not been considered because it is difficult to fully comprehend the scope, measurable areas and extent of deliveries associated with these works until the design has been fully developed. Facades, Roof, MEP Plant areas and fit out activities have not been considered beyond the assumption of the x2 multiplier referenced above for this same reason mixed with the inability to understand the volume of material which can be transported to site on one vehicle, and full deliveries may not be solely for this project.

  As such we have looked to offer an informed ‘best guess’ based on the things we can measure at this stage to inform the EIA submission associated with the planning application. By basing these figures on the assumptions associated with reduced level (2m across the building area), and that all excavated material will be removed from site including piling and basement/ pool and attempting calculations to include reinforcement and steel frames we have looked to address a worst-case scenario.

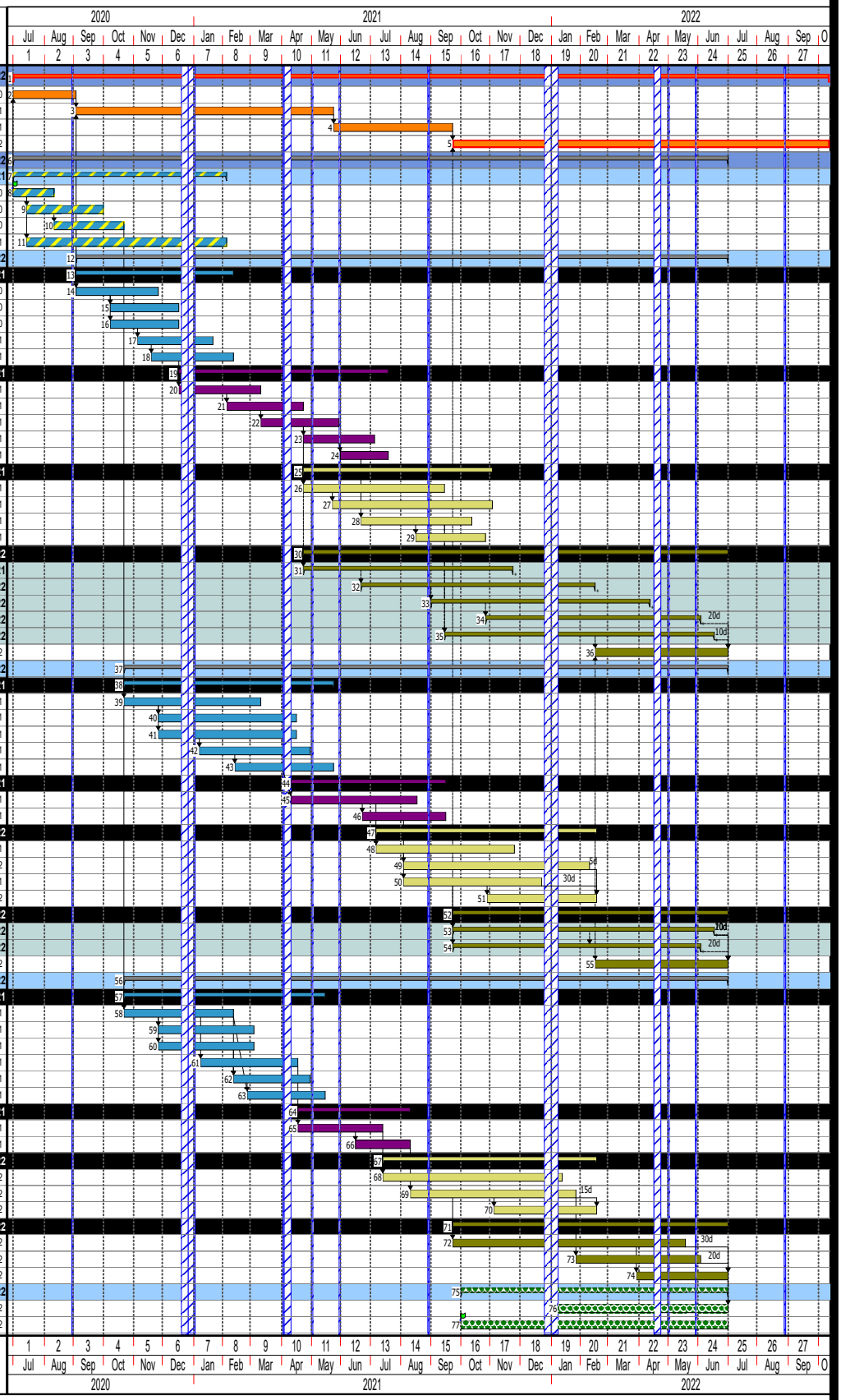
  As we have previously noted there may be trade off’s which look to reduce the scope of delivery movements (retain spoil on site and use of modular buildings for accommodation wings) but at such an early stage it makes sense to offer a higher number rather than lower as any penalties will be associated with exceeding delivery numbers rather than achieving lower and we would welcome a view point from WSP based on past experience for similar size and value developments of this nature to benchmark our figures against.

APPENDIX A

Construction Programme

GREAT WOLF, BICESTER
Outline Construction Programme - Ver 26-09-19

Line	Activity Name	Start	Calendar Weeks	Duration	Finish
1	**Projected Delivery Outline**	01/07/20	119w 1d	111w 3d	12/10/22
2	Enabling; 10 - 130 Loads Per Day; 10 - 50 Men on site	01/07/20	9w 1d	9w	02/09/20
3	Substructure; 60- 130 Loads per Day; 50- 100 Men on Site	03/09/20	37w 3d	34w 1d	24/05/21
4	Superstructure & Envelope; 40 - 80 Loads per Day; 100- 150 Men on Site	25/05/21	17w 2d	17w	22/09/21
5	Envelope & Fit Out; 10 - 60 Loads Per Day; 150 - 400 Men on Site	23/09/21	55w	51w 2d	12/10/22
6	**Construction**	01/07/20	104w 2d	97w	30/06/22
7	**Enabling Works - Site Wide**	01/07/20	31w 1d	29w	03/02/21
8	Setting Out Building Area/ Site Set Up	01/07/20	6w	6w	11/08/20
9	Reduced Level Excavation	15/07/20	11w 1d	11w	30/09/20
10	Import Piling Mat	12/08/20	10w 1d	10w	21/10/20
11	Site Access Roads/ Hardstandings	15/07/20	29w 1d	27w	03/02/21
12	**Rooms & Central Core**	03/09/20	95w 1d	88w	30/06/22
	Piling & Substructure	03/09/20	23w	21w	10/02/21
14	Bearing Piles (Approx 1775 Piles @ 5Nr/ Rig Day Using 6 Rigs)	03/09/20	12w	12w	25/11/20
15	Underground Drainage & Services	08/10/20	10w	10w	16/12/20
16	Excavate & Cast Pile Caps	08/10/20	10w	10w	16/12/20
17	Set Up Formation Level & Prep GF Slab	05/11/20	11w	9w	20/01/21
18	Set Up & Cast Ground Floor Slab	19/11/20	12w	10w	10/02/21
	RC Frame & Roof Steelwork	17/12/20	30w 3d	27w	19/07/21
20	Ground to 1st Floor	17/12/20	12w	10w	10/03/21
21	1st to 2nd Floor	04/02/21	11w 1d	10w	22/04/21
22	2nd to 3rd Floor	11/03/21	11w 2d	10w	28/05/21
23	3rd Floor to Roof	23/04/21	10w 2d	10w	05/07/21
24	Roof Level Structures	01/06/21	7w	7w	19/07/21
	Envelope	23/04/21	27w 3d	27w	02/11/21
26	SFS Wall Cladding & Windows	23/04/21	20w 3d	20w	14/09/21
27	Brickwork Facade	24/05/21	23w 2d	23w	02/11/21
28	Roof Construction Inc Mansards	22/06/21	16w 1d	16w	12/10/21
29	Rainwater Goods	17/08/21	10w 1d	10w	26/10/21
	Fit Out	23/04/21	62w	58w	30/06/22
31	**Level 1 Fit Out (127 Rooms)**	23/04/21	30w 3d	30w	23/11/21
32	**Level 2 Fit Out (151 Rooms)**	22/06/21	34w 1d	32w	15/02/22
33	**Level 3 Fit Out (117 Rooms)**	01/09/21	32w	30w	12/04/22
34	**Ground Floor Fit Out (104 Rooms)**	27/10/21	31w 2d	28w	02/06/22
35	**General Areas**	15/09/21	39w 2d	36w	16/06/22
36	Testing & Commissioning	16/02/22	19w 2d	18w	30/06/22
37	**Hotel Facilities (FoH/ BoH)**	22/10/20	88w 1d	81w	30/06/22
	Piling & Substructure	22/10/20	30w 3d	27w 1d	24/05/21
39	Bearing Piles (Approx 1568 Piles @ 4Nr/ Rig Day Using 5 Rigs)	22/10/20	20w	18w	10/03/21
40	Underground Drainage & Services	26/11/20	20w 1d	17w	15/04/21
41	Excavate & Cast Pile Caps	26/11/20	20w 1d	17w	15/04/21
42	Set Up Formation Level & Prep GF Slab	07/01/21	16w 1d	15w	29/04/21
43	Set Up & Cast Ground Floor Slab	12/02/21	14w 2d	13w	24/05/21
	RC Frame & Roof Steelwork	12/04/21	22w 3d	22w	15/09/21
45	Ground to Roof	12/04/21	18w 2d	18w	17/08/21
46	Roof Level Structures	23/06/21	12w 1d	12w	15/09/21
	Envelope	07/07/21	32w 1d	30w	16/02/22
48	SFS Wall Cladding & Windows	07/07/21	20w 1d	20w	24/11/21
49	Brickwork Facade	04/08/21	27w 1d	25w	09/02/22
50	Roof Coverings	04/08/21	20w 1d	20w	22/12/21
51	Rainwater Goods	28/10/21	16w	14w	16/02/22
	Fit Out	23/09/21	40w 1d	36w 4d	30/06/22
53	**Ground Floor Fit Out**	23/09/21	38w 1d	34w 4d	16/06/22
54	**General Areas**	23/09/21	36w 1d	32w 4d	02/06/22
55	Testing & Commissioning	16/02/22	19w 2d	18w	30/06/22
56	**Waterpark**	22/10/20	88w 1d	81w	30/06/22
	Piling & Substructure	22/10/20	29w 2d	26w 1d	14/05/21
58	Bearing Piles (Approx 576 Piles @ 5Nr/ Rig Day Using 2 Rig)	22/10/20	16w	14w	10/02/21
59	Underground Drainage & Services	26/11/20	14w	12w	03/03/21
60	Excavate & Cast Pile Caps	26/11/20	14w	12w	03/03/21
61	Excavate & Cast Pool & Basement Areas	08/01/21	14w 1d	13w	16/04/21
62	Set Up Formation Level & Prep GF Slab	11/02/21	11w 1d	10w	29/04/21
63	Set Up & Cast Ground Floor Slab	25/02/21	11w 2d	10w	14/05/21
	Steel Frame Inc Roof	19/04/21	16w 2d	16w	10/08/21
65	Ground to Roof	19/04/21	12w 2d	12w	13/07/21
66	Roof Level Structures	16/06/21	8w	8w	10/08/21
	Envelope	14/07/21	31w 1d	29w	16/02/22
68	Wall Cladding & Windows	14/07/21	26w 1d	24w	12/01/22
69	Roof Coverings	11/08/21	24w 1d	22w	26/01/22
70	Rainwater Goods	04/11/21	15w	13w	16/02/22
	Fit Out	23/09/21	40w 1d	36w 4d	30/06/22
72	Phase 1 - Waterpark & Bunker	23/09/21	34w	30w 4d	18/05/22
73	Phase 2 - Changing Areas	27/01/22	18w 1d	16w 4d	02/06/22
74	Testing & Commissioning	30/03/22	13w 2d	12w	30/06/22
75	**External Works**	01/10/21	39w	35w 3d	30/06/22
76	Car Parks/ Roads/ Paths/ Hard Landscaping	10/01/22	24w 4d	23w 2d	30/06/22
77	Landscaping - Waterways & Soft Lansdcaping	01/10/21	39w	35w 3d	30/06/22



Key: Deliveries | Summary | Enabling Works | Substructure | Superstructure | Envelope | Fit Out | External Works

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