THE LONDON RESORT

# The London Resort Development Consent Order

BC080001

## Environmental Statement
## **Volume 2: Appendices**

# Appendix 14.5 - Technical Note 1. People Mover Route . Alignment Options Appraisal, 2020

Document reference: 6.2.14.5
Revision: 00

December 2020

Planning Act 2008
The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009
Regulation 5(2)(a)
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
Regulation 12(1)

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# TECHNICAL NOTE 1

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|---|---|---|---|
| **DATE:** | 30 September 2020 | **CONFIDENTIALITY:** | |
| **SUBJECT:** | London Resort - People Mover Route | | |
| **PROJECT:** | London Resort | **AUTHOR:** | David Dixon |
| **CHECKED:** | Steve Dellow | **APPROVED:** | Richard Hutchings |

# PEOPLE MOVER ROUTE – ALIGNMENT OPTIONS APPRAISAL

## INTRODUCTION

WSP has been engaged to provide transport and highways advice to input to the proposed development of The London Resort (LR) at the Swanscombe Peninsula in Kent. WSP is preparing supporting transport documents for the Development Consent Order (DCO) application, anticipated to be submitted towards the end of 2020.

This technical note has been prepared to set out the potential options for a public transport route and pedestrian / cycle route from Ebbsfleet International Station to the Resort, specifically in the area of Baker's Hole SSSI between the station and Bamber Pit.

Through extensive assessment and design, a proposed dedicated Resort access road has been designed running adjacent to the High Speed (HS1) rail line linking the Resort with the A2 and Ebbsfleet International Station.

It is anticipated that a proportion of visitors and staff will travel to the Resort via rail, predominantly utilising Ebbsfleet International Station, which provides excellent connections from London and Kent, alongside access from mainland Europe.

Given the importance of Ebbsfleet International Station as a means of accessing the Resort, a key component of the access strategy is a dedicated public transport, pedestrian and cycle corridor between the station and the Resort. It is likely that several different services could utilise this route which would include;

- A privately operated 'land train' providing direct connections between Ebbsfleet Station and London Resort
- Fastrack bus services
- Other local bus services
- Walking and cycling

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## CONSTRAINTS

The route options appraisal is complicated by various existing constraints within the area which have been set out in detail below.

1 Site of Special Scientific Interest (SSSI)

Baker's Hole SSSI is located between Ebbsfleet International Station and the Resort.

Where the public transport route is proposed to pass through this area we have assumed a "no dig" construction would be implemented and all material build up for the road would be above ground. Specialist protection would also be required on the existing ground surface. Therefore, the vertical alignment has been designed assuming the full depth of the foundation plus any protection measures will be allowed for above the existing natural ground level.

The exact boundary and full extents of the SSSI does not appear clear from natural ground features and aerial mapping, however for this exercise we have assumed that the adjacent landfill to the west runs up to the edge of the SSSI. The topographical survey extends to the start of vegetation at the edge of the landfill area. The landfill area is surrounded by a cut-off ditch assumed to protect against contamination leaving the site.

Notwithstanding above, it is evident that previous construction has been undertaken within this SSSI boundary by way of the existing station car park. We would like to comment therefore that delivery of low scale development with minimal intrusion within the SSSI has been established and a precedent now set and should therefore not be discounted for any future proposals, subject to appropriate mitigation.

2 Scheduled Ancient Monument (SAM)

In the same location as the SSSI but covering a slightly smaller area are the remains of an ancient settlement. Some features appear on the surface and potential archaeological remains may reside beneath the grounds surface. A report has been produced by Wessex Archaeology to assess the route options discussed within this note regarding archaeological impacts (Ref: 106571.01, July 2017)

We have assumed that the route of any new link would need to avoid any monument features on the ground's surface with adequate clearance to prevent damage during construction, operation or decommissioning. It is assumed that features below the ground surface should be not be disturbed and would be protected by a "no-dig" construction.

3 Landfill

To the west of the area occupied by the SSSI and the SAM the ground rises in a mound covering a previous landfill site.

To avoid disturbing and excavating into the landfill, any route over the landfill would have to sit on top of the existing ground. Given the topography of the landfill at this location it is not possible to design a route over the landfill that would have acceptable gradients for walking, cycling and vehicles.

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## 4 Existing Right of Way

To the north of the SSSI an existing path/right of way crosses the HS1 rail line to the east of the site running approximately East-West.

We have limited the increase in level of the new link above the existing path level to allow for a crossing point to be constructed. We have assumed that the existing path can be locally reconstructed to suit and may ramp up over a short distance to get over the vertical alignment of the new link.

## 5 Chalk Spine supporting local railway line

Further to the north a Chalk Spine (steep embankment) exists which supports a local railway line. Previous work undertaken by the geotechnical engineers have informed the team that the proposed link road tunnel will need to have a certain depth of cover above it to maintain the structural integrity of the railway.

Levels of the new road alignment will be largely governed by the geo-technical requirements and rock characteristics of the chalk and predominantly fixes the (vertical) design of both the Resort access road, land train route and pedestrian links at this point.

## 6 Extra High Voltage (EHV) Pylons

Within the SSSI, two pylons are located supporting EHV cables. We have assumed for the purposes of the land train route, that these will remain, and that clearance should be provided to the pylon bases to maintain easements as well as allow maintenance access and also to not to undermine the foundations. This is based on our estimate of the base locations based on the topographical survey.

## 7 Vertical Geometrical standards

As the link needs to cater for both cyclists and pedestrians, we have limited the maximum gradient to 5% (1:20), this complies with advice in building regulations and other national standards for the safe passage of pedestrians. Although vehicular traffic can be designed with steeper gradients, we have treated the new link as a combined route.

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## DESIGN PARAMETERS (CROSS SECTION)

With regards to the provision of a new Land Train Route serving the London Resort, the following design parameters have been used.

- Carriageway for bus route / land train: 6.5m
- Cycleway width: 2m
- Footway width: 3m

We have also assumed:

- Separation between vehicles and cycles/pedestrians- verge/hard surface: 1.5m
- Batters (unsupported): 1 in 3 embankment
- Total Road Corridor = 13m + embankments/cutting (typically less than 20m total width)

## ROUTE OPTIONS

Taking account of the key constraints set out above, the general principle in developing this people mover is to minimise damage to the ground and utilise methods of construction that enables the delivery of the route without any dig or excavation. This will enable us to deliver a scheme that leaves both the SSSI and SAM in place with minimal impact. This will see a form of construction that reduces loads on the sub-strata and provides the opportunity for investigation by the relevant authorities if required. This approach has been discussed with the various stakeholders and is generally accepted as an appropriate solution.

*OPTION A - WSP DRAWING 3529-DI-SK-101*

Option A would be designed directly through the middle of the SSSI and SAM.

Initially it passes East of the first EHV Pylon. This Pylon is situated in a steep depression approximately 5 to 6m in depth. To allow for an embankment and/or retaining feature a clearance zone has been included. It has been assumed that depositing fill on the foundations pylon will not be acceptable and thata working width for construction will be required.

The alignment then turns to the left to avoid the 2nd EHV Pylon before moving right to avoid the ancient monument features.

**Advantages:**

- The slopes will be more favourable for cyclists and pedestrians considering the length of the route and the changes in level.
- The route is the most direct and does not require any excavation nor does it impact upon the landfill

**Disadvantages:**

- Does not avoid the SSSI and assumes that a proprietary foundation system (such as polystyrene embankments) and protection can be designed to prevent damage to the SSSI to the satisfaction of the authorities.
- Does not avoid the SAM and assumes that a proprietary foundation system and protection can be designed to prevent damage to the SAM to the satisfaction of the authorities.
- Passes through a deep depression around the EHV Pylon requiring imported fill.
- Would require the clearing of a large amount of vegetation and trees.

*OPTION B (NOT DRAWN)*

Option B would be designed immediately, and grade separated directly over the proposed vehicular access road. The access road is already constrained north of Ebbsfleet Station given the existing pylon just to the west of the HS1 line. The implications of this means there is no available space to introduce the required structures to support a people mover route over the proposed access corridor and with limited space to then route to its own tunnel through the chalk spine.

We understand HS1 and the Rail Authorities would be nervous about both safety (the potential for a bus to leave the road and career onto the tracks), and security (the increased vulnerability of the rail route from a terrorism perspective). In both cases, significant works will be required to protect the HS1 route and the people mover route.

In terms of the southern approach of HS1 trains, there is also the increased challenge of night-time headlights from vehicles on at this elevation, even with screening. The vertical alignment approaching the ROW and chalk spines will also be extremely challenging, if not impossible, to accommodate, especially for cycle gradients.

As such, this option has not been taken any further as a possible solution to deliver the People Mover Route.

*OPTION C– 3529-DI-SK-102*

Option C would run along the eastern boundary of the landfill area, the intention being to avoid affecting the SSSI (blue boundary area on plan) or SAM (area shown within red boundary). At the outset, crossing the landfill has not been considered as a favourable option. The complications with excavating the landfill, which includes excavation of hazardous waste materials, interference with leachate and gas management infrastructure (requiring subsequent reinstatement) and Environmental Permitting implications, has significant adverse environmental implications that would be difficult to justify, given the alternative options available. It is also extremely inefficient to design the route over the landfill's existing topography, that would have acceptable gradients for walking, cycling and vehicles without constructing significant earthworks to the north and south.

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Regarding Option C, after clearing the northern end of the SSSI (where it intercepts the existing path) it can then move back eastwards to follow parallel to the main vehicular route. The vertical alignment would generally follow the existing car park for most of the car park's length, before needing to rise up to follow the existing ground profile. It would then drop down to pass through the chalk spine underneath the railway.

It is anticipated that the vehicle carriageway and path would be designed with a 1 in 40 (2.5%) crossfall in the direction of the topography. The separation verge has a gradient of 1 in 3 to minimise the embankments or retaining structures on the eastern side of the new link.

**Advantages:**

- Avoids the majority of the SSSI.
- Avoids the SAM.
- Avoids the EHV Pylons.
- Avoids steep depression adjacent to pylon with additional fill and associated works.
- Relatively free from vegetation and trees

**Disadvantages:**

- A retaining feature is required on the eastern edge for part of its length as it is not possible to construct an unsupported earth embankment at 1 in 3* on this side without entering the SSSI. The location is shown along chainage 280-440 on the attached plan. This is due to the steepness of the existing ground from West to East. The vertical gradient prevents moving the alignment further west.
- Whilst gradients provided comply with design standards, the slopes will not be favourable for leisure cyclists or walkers considering the length of the route and the changes in level.The excavation into the landfill would involve excavation of hazardous waste materials, interference with leachate and gas management infrastructure (requiring subsequent reinstatement) and have Environmental Permitting implications).

*OPTION D– 3529-DI-SK-103*

Option D follows a similar route to that of Option C, but is on the boundary / outside of the landfill and just within the boundary of the SSSI rather than outside the area. As Wessex Archaeology report states, *"Although it likewise passes north-south through the VERY HIGH potential area PP 07, it passes down the west side of this area (zones 3.6 and 3.7), avoiding the transitional zone between Site A and ZR4."*, It further suggests that the existing broad survey and investigation of this particular area lends itself to producing a moderate scale programme of targeted fieldwork, with high confidence that it would provide adequate mitigation for archaeological impacts that this highway route raises.

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## CONCLUSION

It is evident that all routes are affected by existing constraints. The use of the landfill as a route option has been discarded given the adverse environmental effects of excavating a landfill.

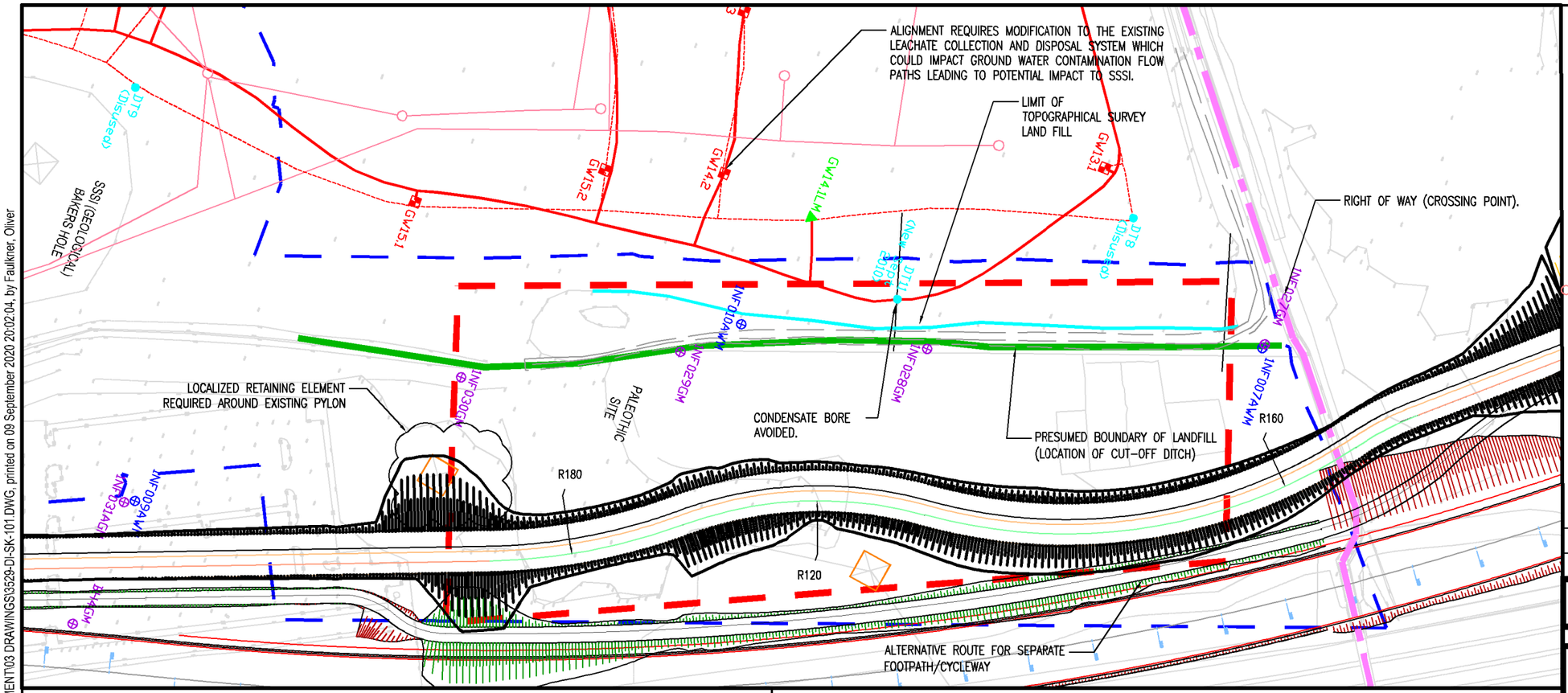
Promoting a route adjacent to the vehicular access corridor has also been discarded as the land constraints between HS1 and the existing pylon will restrict any suitable structure that could support the route, together with the constraints implications a route at this level and in close proximity to HS1 will have upon the rail line.

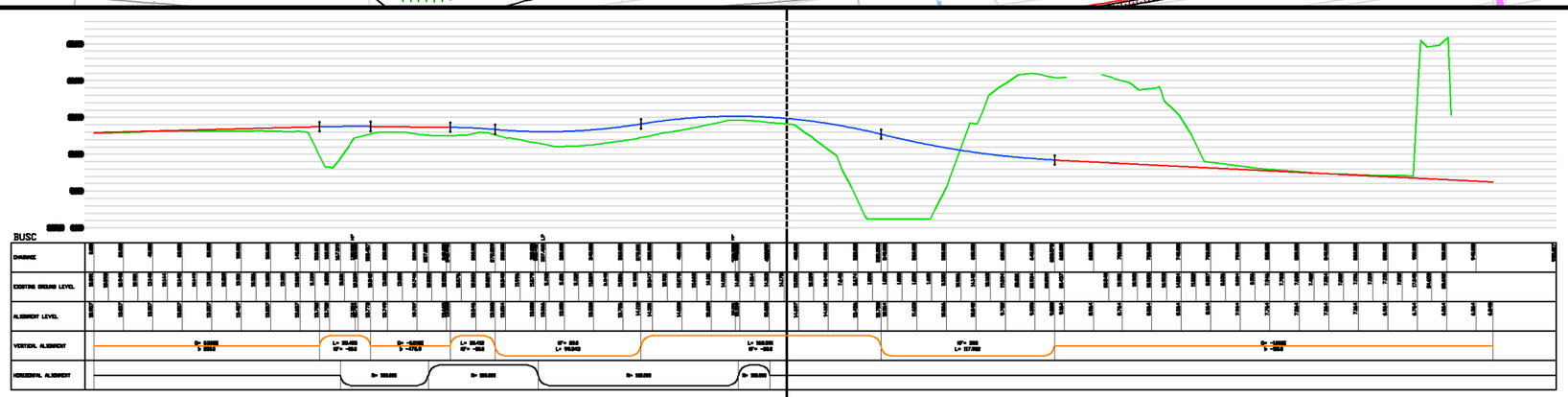
As such, the route options for the Land Train Route are reduced to Option C and Option D.

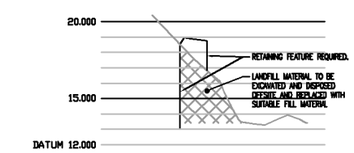
Option C routes along the western edge of the SSSI and whilst not within it, in order remove any need to excavate any of the landfill, the scheme will require earthworks over the top of the SSSI.

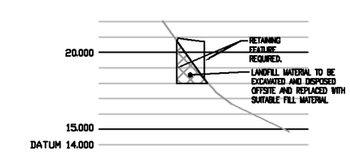
As Option C will still have an impact upon the SSSI, the preferred option is Option D which routes over the SSSI. It is considered that the proposed route can be designed to run on top of the SSSI utilising a proprietary foundation system reducing any need to excavate and therefore has no larger impact than Option C. Furthermore, this route is further away from the landfill reducing any potential impacts of building in proximity and provides gradients more favourable for cyclists and walkers.

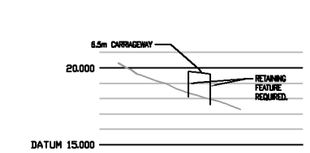
The preferred route is therefore Option D provided within WSP Drawing 3539-DI-SK-103.




# DO NOT SCALE

NOTES:
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- DT4 CONDENSATE DRAIN TRACKS
- 1NE007BWM EXISTING GROUNDWATER MONITORING POINTS

| REV | DATE | BY | DESCRIPTION | CHK | APP |
|---|---|---|---|---|---|
| A | 09/09/2020 | OJF | FIRST ISSUE | | |

DRAWING STATUS: S2 - FOR INFORMATION

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T+ 44 (0) 1256 318 800, F+ 44 (0) 1256 318 700
wsp.com

CLIENT:

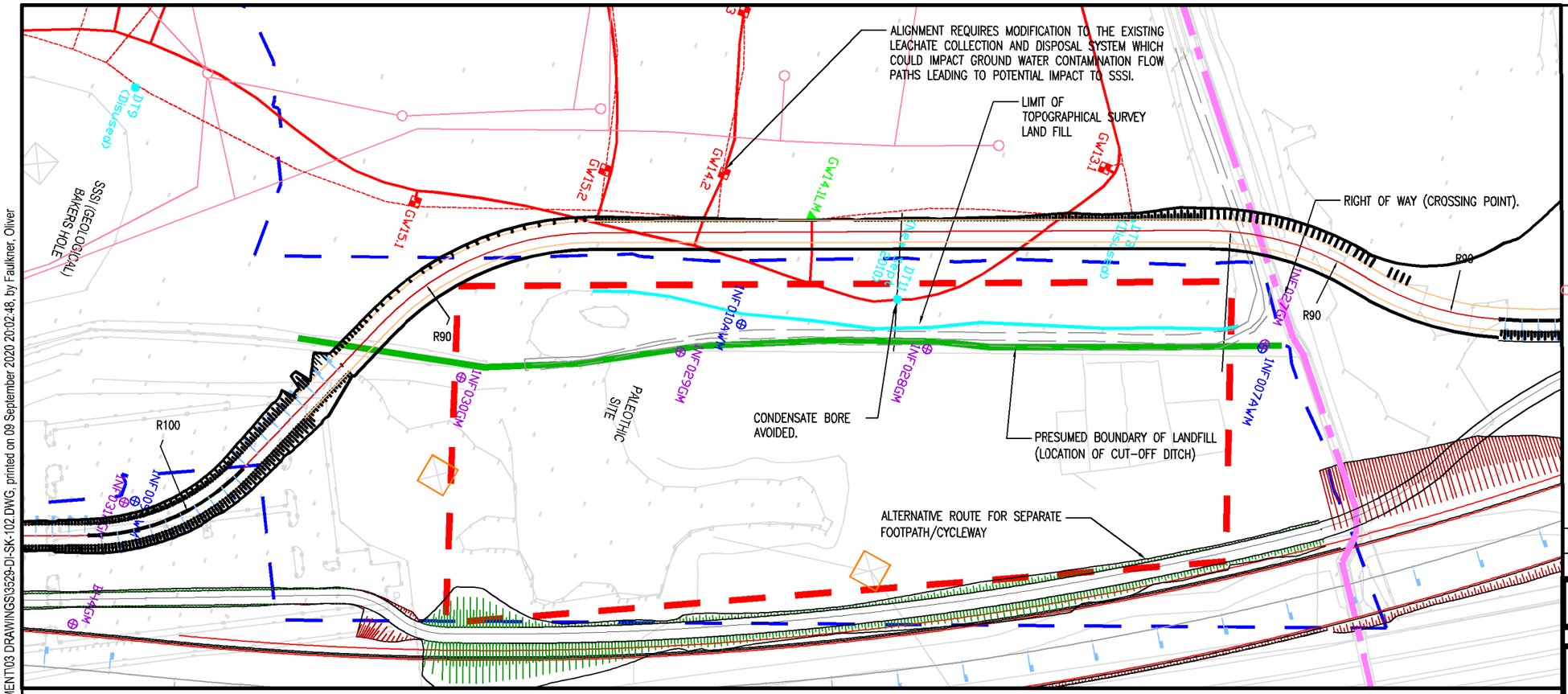
ARCHITECT:

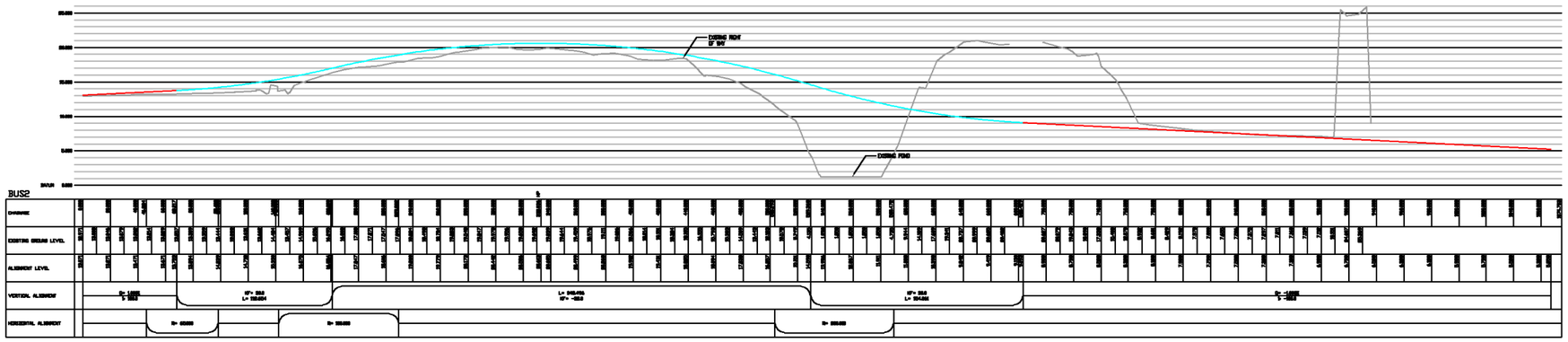
PROJECT: LONDON RESORT

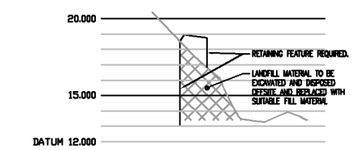
TITLE: PEOPLE MOVER ROUTE OPTION A

| SCALE @ A3: | CHECKED: | | APPROVED: |
|---|---|---|---|
| 1:1500 | SD | | SD |
| PROJECT No: 70063529 | DESIGNED: OJF | DRAWN: OJF | DATE: September 20 |

DRAWING No: 3529-DI-SK-101 REV: A

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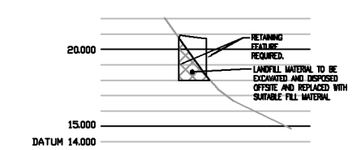
| GROUND LEVEL | 19.585 | 18.535 | 17.547 | 17.000 | 15.498 | | 13.888 |
| FEATURE LEVEL | | 18.535 | 18.865 | 18.791 | 18.768 | 13.404 | |




CHAINAGE 320.000

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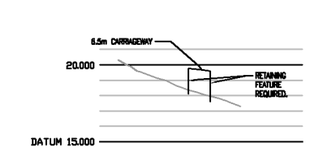
| FEATURE LEVEL | | 20.773 | 20.536 | 20.292 | 18.248 | |

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| FEATURE LEVEL | | 18.607 | 18.357 | 19.681 | 19.599 | 17.731 |

ALIGNMENT BUS2

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ARCHITECT:

PROJECT:
LONDON RESORT

TITLE:
PEOPLE MOVER
ROUTE OPTION C

| SCALE @ A3: | CHECKED: | APPROVED: |
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| 1:1500 | SD | SD |

| PROJECT No: | DESIGNED: | DRAWN: | DATE: |
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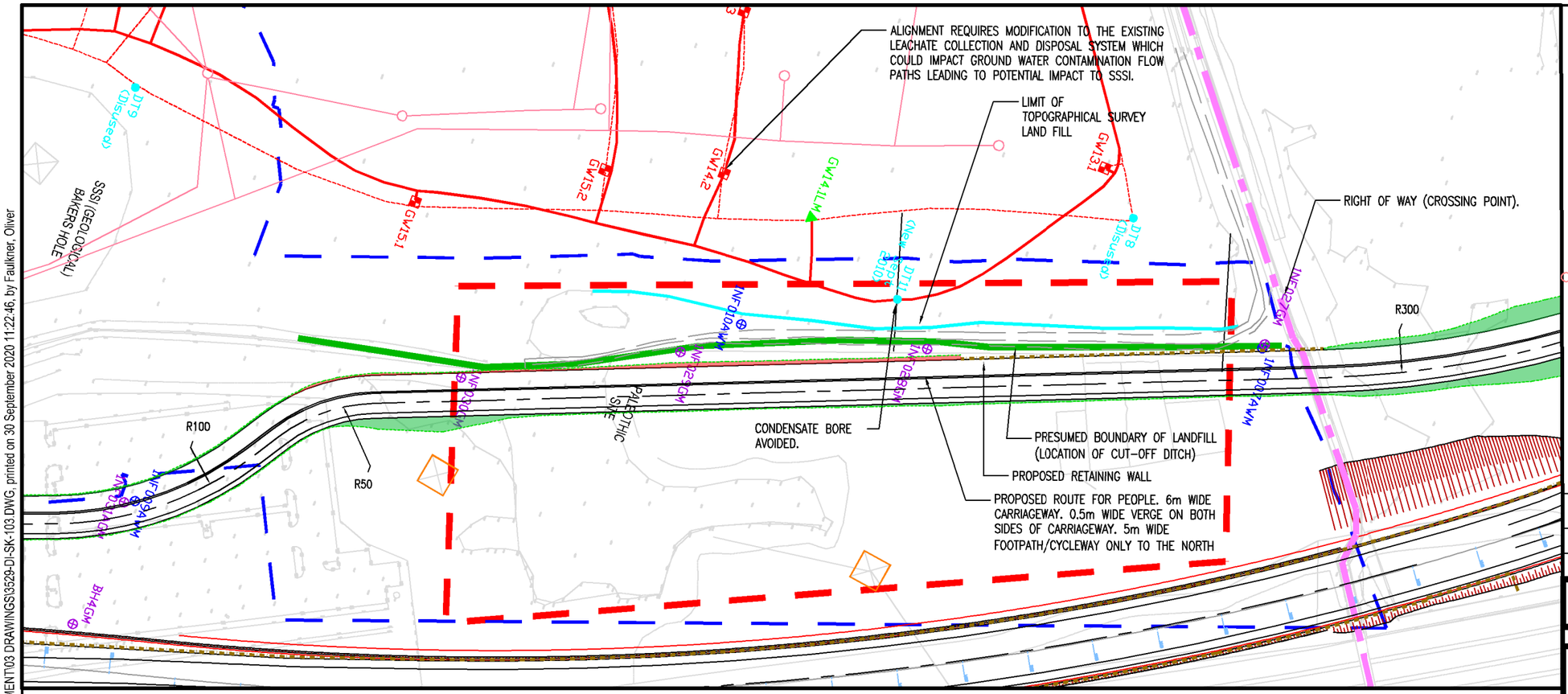
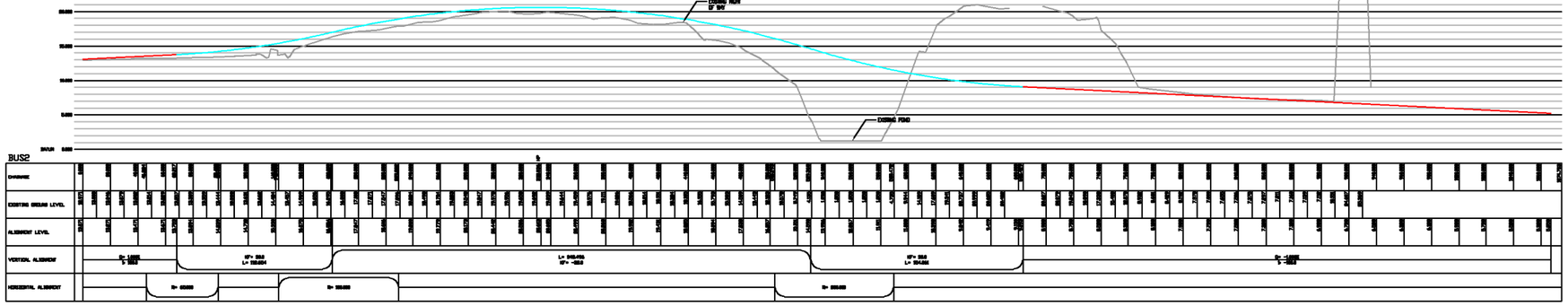
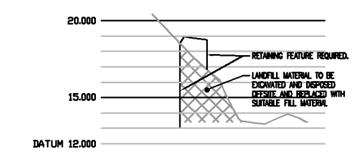
| 70063529 | OJF | OJF | September 20 |

DRAWING No: 3529-DI-SK-102
REV: A

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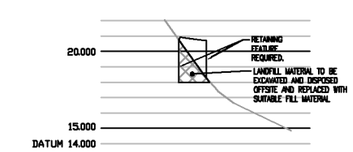


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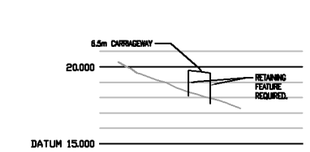


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| REV | DATE | BY | DESCRIPTION | CHK | APP |
|---|---|---|---|---|---|
| B | 30/09/2020 | YO | FOOTPATH/CYCLEWAY MOVED WEST OF PEOPLEMOVER ROUTE | | |
| A | 09/09/2020 | OJF | FIRST ISSUE | | |

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ARCHITECT:

PROJECT: LONDON RESORT

TITLE: PEOPLE MOVER ROUTE OPTION D

| SCALE @ A3: | CHECKED: | | APPROVED: |
|---|---|---|---|
| 1:1500 | SD | | SD |
| PROJECT No: 70063529 | DESIGNED: OJF | DRAWN: OJF | DATE: September 20 |

DRAWING No: 3529-DI-SK-103 REV: B