NORTH LINCOLNSHIRE GREEN ENERGY PARK

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Contents

Acronyms and Abbreviations

Name	Description
AOD	Above Ordnance Datum
BAT	Best Available Techniques
BEIS	Department for Business, Energy and Industrial Strategy
CBMF	Concrete Block Manufacturing Facility
CO2	Carbon Dioxide
CSM	Conceptual Site Model
DCLG	Department for Communities and Local Government
DCO	Development Consent Order
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DQRA	Detailed Quantitative Risk Assessment
EIA	Environmental Impact Assessment
ERF	Energy Recover Facility
ES	Environmental Statement
EU	European Union
FOC	Rail Freight Operating Company
GI	Ground Investigation
GQRA	General Quantitative Risk Assessment
Ha	Hectares
HE	Historic England
HER	Historic Environment Record
HGV	Heavy Goods Vehicles
HSE	Health and Safety Executive
IBA	Incinerator Bottom Ash
IED	Industrial Emissions Directive
IMV	Internal Movement Vehicle
KM/H	Kilometres per Hour

LDF	Local Development Framework
LPA	Local Planning Authority
M	Metres
M bgl	Metres below ground level
MHCLG	Ministry for Housing, Communities and Local Government
MPH	Miles per Hour
MT	Metric Tonnes
MWhe	Electrical generation in megawatt-hours (electric)
NLC	North Lincolnshire Council
NLGEP	North Lincolnshire Green Energy Park
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NPSNN	National Policy Statement on National Networks
NSIP	Nationally Significant Infrastructure Project
NT	Northern Trains
ORR	Office of Rail & Road
PA	Planning Act
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
PPE	Personal Protective Equipment
PPG	Planning Practice Guidance
Q	Trains which operate as ReQuired
QRA	Qualitative Risk Assessment
RDF	Refuse Derived Fuel
RW	Residual Waste
RHTF	Residue Handling and Treatment Facility
SAC	Special Area of Conservation
SI	Site Investigation
SLU	Standard Length Units
SOCC	Statement of Community Consultation

SOCG	Statement of Common Ground
SoS	Secretary of State
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TCPA	Town and Country Planning Act
TPE	TransPennine Express
TPR	Timetable Planning Rules
UK	United Kingdom
WFD	Waste Framework Directive
WMP	Waste Management Plan
WTS	Waste Transfer Station
WTT	Working Timetable

1 Introduction

1.1 Overview

1.1.1 This report sets out the proposed operation of trains moving freight to site in connection with the operation of the Project.

1.1.2 This chapter has been informed by the Transport Assessment (TA), Framework Travel Plan and outline Construction Logistics Plan (CLP) for the Project, which are submitted as appendices to Chapter 13 of the Environmental Statement (**Document Reference 6.2.13**).

1.2 Policy Context, Legislation, Guidance and Standards

1.2.1 The Environmental Statement has undertaken a review of general planning and strategic policy and guidance such as national policy documents and the Local Development Frameworks (LDF) and community strategies.

1.2.2 The outline design of the rail infrastructure and operations associated with the Project has taken account of relevant design guidance and standards as may apply to private railways and the national rail network respectively.

1.3 Consultation

1.3.1 The Project has engaged with the following parties on the outline design of the rail infrastructure and associated operations:

- Network Rail: licenced operators of the national rail network, providing a direct rail connection to Vossloh Cogifer at Dragonby Sidings which in turn provides an end-on connection to the Project via the Flixborough Branch Line. Whilst Network Rail has no direct responsibility for, or involvement in, the design and operation of the Flixborough Branch Line, it provides the wider network on which fuel would be delivered to the Project by rail. The Project established contact with Network Rail in September 2020, with a formal request for engagement made in November 2020, contact maintained throughout the intervening period;

- Vossloh Cogifer: owners and operators of the Dragonby Sidings site, which would form the intermediate staging point between the Flixborough Branch Line and Network Rail. The Project established contact with Vossloh Cogifer in November 2020, contact maintained throughout the intervening period.

1.4 Project Description

1.4.1 The North Lincolnshire Green Energy Park (NLGEP) ('the Project'), located at Flixborough, North Lincolnshire, is a Nationally Significant Infrastructure Project (NSIP) with an Energy Recovery Facility (ERF) capable of converting up to 760,000 tonnes of non-recyclable waste into 95 MW of electricity at its heart and a carbon capture, utilisation and storage (CCUS) facility which will treat the excess gasses released from the ERF to remove and store carbon dioxide (CO2) prior to emission into the atmosphere.

1.4.2 The NSIP incorporates a switchyard, to ensure that the power created can be exported to the National Grid or to local businesses, and a water treatment facility, to take water from the mains supply or recycled process water to remove impurities and make it suitable for use in the boilers, the CCUS facility, concrete block manufacture, hydrogen production and the maintenance of the water levels in the wetland area.

1.4.3 The Project will include the following Associated Development to support the operation of the NSIP:

- a bottom ash and flue gas residue handling and treatment facility (RHTF)
- a concrete block manufacturing facility (CBMF)
- a plastic recycling facility (PRF)
- a hydrogen production and storage facility
- an electric vehicle (EV) and hydrogen (H2) refuelling station
- battery storage
- a hydrogen and natural gas above ground installations (AGI)
- a new access road and parking
- a gatehouse and visitor centre with elevated walkway
- railway reinstatement works including, sidings at Dragonby, reinstatement and safety improvements to the 6km private railway spur, and the construction of a new railhead with sidings south of Flixborough Wharf
- a northern and southern district heating and private wire network (DHPWN)
- habitat creation, landscaping and ecological mitigation, including green infrastructure and 65 acre wetland area

- new public rights of way and cycle ways including footbridges
- Sustainable Drainage Systems (SuDS) and flood defence; and
- utility constructions and diversions.

1.4.4 The Project will also include development in connection with the above works such as security gates, fencing, boundary treatment, lighting, hard and soft landscaping, surface and foul water treatment and drainage systems and CCTV.

1.4.5 The Project also includes temporary facilities required during the course of construction, including site establishment and preparation works, temporary construction laydown areas, contractor facilities, materials and plant storage, generators, concrete batching facilities, vehicle and cycle parking facilities, offices, staff welfare facilities, security fencing and gates, external lighting, roadways and haul routes, wheel wash facilities, and signage.

1.4.6 The overarching aim of the Project is to support the UK's transition to a low carbon economy as outlined in the Sixth Carbon Budget (December 2020), the national Ten Point Plan for a Green Industrial Revolution (November 2020) and the North Lincolnshire prospectus for a Green Future. It will do this by enabling circular resource strategies and low-carbon infrastructure to be deployed as an integral part of the design (for example by reprocessing ash, wastewater and carbon dioxide to manufacture concrete blocks and capturing and utilising waste-heat to supply local homes and businesses with heat via a district heating network).

2 Use of rail transport for residual waste

2.1 Overview

2.1.1 The transportation of Residual Waste (RW) by rail has been undertaken throughout the UK for over 40 years, starting in 1977 with a contract from the Greater London Council (GLC) to move containerised waste from a rail-served WTS in Brentford to a landfill site at Appleford in Oxfordshire, followed by a second contract with the GLC to move RW between Cricklewood and landfill sites at Stewartby and later Calvert (Buckinghamshire). RW is collected at Waste Transfer Stations (WTS) before being compacted into purpose-built steel containers which are then sealed for transit.

2.1.2 RW is currently moved in trains which vary in length and payload from 16 to 26 wagons (48 to 78 containers) for the following customers / operators:

- West London Waste Authority / SUEZ: daily trains connect rail-served WTS in Northolt and Brentford with an ERF at Severnside near Bristol (118 miles each way);
- Merseyside Recycling and Waste Authority (MRWA) / SUEZ: two daily trains connect a rail-served WTS at Knowsley with an ERF at Wilton on Teesside (165 miles each way);
- Greater Manchester Combined Authority (GMCA) / SUEZ: three daily trains connect rail-served WTS at Bredbury, Brindle Heath, Dean Lane and Northenden with an ERF at Runcorn.

2.1.3 Other types of waste materials are carried in conventional railway wagons (construction spoil and shredded materials), but in the case of the Project the nature of the material would not be suitable for carriage in this manner. Additionally, Incinerator Bottom Ash (IBA) is moved by rail from the ERF at Newhaven in Sussex to Brentford in London for use as a secondary aggregate, and more recently from an ERF at Cardiff to Avonmouth Docks, the IBA being transferred to conventional wagons using front loading shovels. Shredded waste is also moved from Doncaster to landfill at Roxby Gullett to the north of the Project.

2.2 Train operations

2.2.1 Most of the licenced rail Freight Operating Companies (FOC) have experience in the movement of waste materials, the current operators being as follows:

- DB Cargo UK - current operators of the West London and Merseyside ERF contracts;
- DC Rail - move construction spoil from various locations;

- DRS - move nuclear waste from power stations and other facilities to disposal points;
- Freightliner - current operator of the Greater Manchester ERF contract;
- GB Railfreight - move construction spoil from various locations;
- Colas Rail – no waste traffic handled to date.

2.2.2 Trains (Appendix A Figure 1) typically comprise the following:

- Diesel-electric locomotive (Classes 66/70 or equivalent), typically 21m in length;
- Intermodal wagons, 20m in length, each carrying 3 x 6m (20') length waste containers and typically formed of permanently-coupled pairs;
- The waste containers have a tare (unladen) weight of 3.5 – 4.5 mt with a gross weight of up to 20 mt. Depending on the nature of the material carried, payloads of between 10 – 15 mt per container can be achieved, with an average across existing rail-based services of 13.5 mt. The height of the containers when carried on standard (1m high) wagons requires a minimum loading gauge[1] of W8.

2.2.3 Despite the virtual elimination of coal traffic for electricity and industrial use, which at the time of privatisation accounted for a quarter of all rail freight traffic, the FOCs have grown the non-coal market from 10 to 17 billion tonne-km per annum, a 70% increase in traffic.

2.2.4 Moving freight by rail is more environmentally sustainable than by road haulage. The Government has noted that each tonne of freight transported by rail reduces carbon emissions by 76% compared to road, and each freight train removes 43-76 HGVs from the roads.[2]

2.2.5 The domestic rail industry (ie train operators, leasing companies and end users) accounts for around 2,000 locomotives and nearly 30,000 wagons, of which over 7,000 are purpose-built for carrying containers, with 1,700 of these being of the same types as used on the current waste services – the equivalent of 85 x 20-wagon trains, against the 5-6 waste trains operated per day at present.

[1] Maximum height / width of a railway vehicle and its payload. Loading gauge varies from W6A (minimum) to W12 (maximum)
[2] Rail Freight Strategy, Department for Transport 2016, para 42

2.3 Railhead operations

2.3.1 The basic process involved in handling RW or Refuse Derived Fuel (RDF) at an ERF is shown at the SUEZ facility at Severnside (Appendix A Figure 2). In this case the railhead is operated using overhead gantry cranes, used where sidings and handling aprons can be constructed on straight alignments.

2.3.2 The alternative forms of handling equipment are mobile rubber-tyred vehicles such as frontloaders or reachstackers (Appendix A Figure 3). Internal movement vehicles (IMVs, Figure 3) are then used to shuttle containers between the railhead and ERF tipping hall. At WTS similar arrangements have been used, gantry cranes or frontloaders moving containers direct from the compactors to the trains.

3 Proposed rail operations

3.1 Overview

3.1.1 Flixborough Wharf was originally connected to a much larger local industrial rail network, which also served the nearby chemical and steelworks facilities (Figure 4 in Appendix A). The Wharf retains a disused branch line (last reported in use around 2012) which connects with exchange sidings at Dragonby (partially still in use by Vossloh) and in turn with a main line connection with Network Rail infrastructure known as Normanby Park Ground Frame (still in use by Vossloh). From this point, the Flixborough Wharf branch line links to the operational Network Rail freight branch line linking the landfill site at Roxby Gullet (in use by BIFFA) with the main Scunthorpe to Doncaster main line at Trent Junction.

3.1.2 The branch line extends for a distance of around 6.5km between Dragonby Sidings and Flixborough Wharf, starting from Dragonby Sidings at a height of 29m AOD and climbing to 49m AOD at its most northerly point before descending again to reach 6m AOD at Flixborough Wharf, with sections having gradients of up to 1:37. The horizontal alignment features a series of straight and curved sections of track, the latter typically around 200m radius. The combination of vertical and horizontal geometry would naturally restrict the maximum speed of trains along the branch line to no more than 40km/h (25mph).

3.2 Construction phase

3.2.1 Construction materials are expected to be transported by a combination of road, river and rail. Rail offers scope to move materials such as construction spoil, aggregates, sand, cement, reinforcement bar and other structural steel. The key dependencies would be the phasing of the works to reinstate the disused branch line from Dragonby Sidings through to the Project, as well as the availability of suitable rail-linked sources of material at sufficient scale and/or distance from the Project to make rail viable for transportation.

3.2.2 The use of rail during construction would be explored further as the scheme develops. In the interim, the HGV vehicle trip generation set out in the ES for the construction phase is based on a worst-case assumption that 100% of freight would arrive/depart by road transport.

3.2.3 In the event that rail was a viable option to support the construction phase, based on the assumption that a train bringing fill material to Flixborough Wharf would handle an average of 2,000mt, use of rail would represent between 3 and 20 additional train movements at Flixborough Wharf per month during the construction phase and a maximum total of 50 train movements per year between 2022 and 2026.

3.2.4 This increase of train movements could be adequately accommodated at Flixborough Wharf during the construction phase and, depending on the material and type of rail wagons employed, would not require any changes to the yard or the handling equipment.

3.3 Operational phase

3.3.1 The assumptions for movement of fuel by rail to the Project are as follows:

- Traction: diesel-electric freight locomotives, typically any of Classes 56, 59, 60, 66, 69 or 70;
- Wagons: type "FCA" or equivalent, twin-set wagons able to carry 6 x 6m length containers per twin-set;
- Containers: 6m length x 2.4m wide x 2.6m high, tare weight 4.9 mt, payload up to 13.5 mt;
- Train length: 1 x locomotive (21.5m) plus 13 x twin wagons (each 40.5m) = 548m;
- Train weight: 1 x locomotive (127mt) plus 13 x twin wagons (41mt per twin-wagon set carrying 78 containers (4.9mt + 13.5mt payload) = 2,095 mt.

3.3.2 In the event of 100% of inbound fuel being delivered by rail, assuming 758,376 mt per annum of fuel and a train payload of 1,053 mt, this would equate to 720 train arrivals per annum, or 2 trains per day on 360 days per annum or 3 trains per day on 240 days per annum.

3.3.3 Trains inbound to the Project would typically arrive from the rest of the country via Scunthorpe (Appendix A Figure 4), passing Trent Junction and the access to the branch line to Roxby Gullett and Flixborough. Once clear of Trent Junction, the locomotive would detach and run-round its train using the main line tracks, attaching to the rear of the train to draw forward to Trent Junction and the branch line.

3.3.4 Once clear of Trent Junction, the train would travel north to Normanby Park Ground Frame which provides the connection between the branch line and Dragonby Sidings (owned and used by Vossloh Cogifer). The set of points providing the connection are currently manually operated.

3.3.5 Network Rail has indicated that the current rail freight services which serve the Roxby Gullett landfill may have ceased by the time the Project is operational, such that the existing manual operation at Normanby Park Ground Frame would suffice for the purposes of the Project and Vossloh.

3.3.6 In the event that the landfill trains are still in operation, an alternative signalling solution has been discussed and agreed with Network Rail, which could be installed by Network Rail within its own signalling infrastructure.

3.3.7 From the Normanby Park Ground Frame, trains would then enter the western half of the Dragonby Sidings, which would act as the exchange point between Network Rail and the Project. The eastern half of Dragonby Sidings are used by Vossloh for handling track maintenance equipment and materials. The western sidings are currently too short to accommodate the baseline train length of 548m, and it is therefore proposed to remodel the sidings as part of the Project to create two arrival/departure sidings primarily for use by trains to and from Project.

3.3.8 Trains from Trent Junction would then typically be held on arrival in Dragonby Sidings, to await clearance from the Project to proceed. In the event that another train is already on the railhead or branch line, the inbound train would be held in Dragonby Sidings until the outbound train has passed on the adjacent track, allowing the inbound train to then proceed to the Project.

3.3.9 There are a number of existing / former crossings of the main line, including (Appendix A Figure 4):

- Chainage 4550m: crossing for wind farm maintenance access, to be retained;
- Chainage 5350m: crossing for wind farm / agricultural access (this also forming the crossing point for a sub-surface electricity transmission cable from the windfarm), to be retained;
- Chainage 5925m: Normanby Road highway overbridge, to be retained;
- Chainage 7175m: a former crossing, severed in previous years when the section of line was fenced in, proposed for reinstatement with a new footbridge crossing of the branch line;
- Chainage 7575m: an existing footbridge accommodation crossing, which is in poor condition and is proposed for replacement with a new footbridge crossing of the branch line;
- Chainage 8150m: crossing for pedestrian / agricultural access, to be retained;
- Chainage 8325m: Stather Road highway overbridge, to be retained;
- Chainage 8950m: railway overbridge crossing of private access, to be retained.

3.3.10 The three existing at-grade crossings of the branch line (Chainages 4550m, 5350m, 8150m) are proposed to be protected with new signage and gates to seal off the respective crossing / rail formation to traffic as required. The gates would normally be closed across the branch line to enable unfettered pedestrian / vehicular access, but with each train movement the following sequence would apply:

- As each train approaches a crossing, the driver would bring the train to a stand ahead of the crossing;
- A second member of traincrew would then climb down from the locomotive to proceed on foot to the crossing, checking that the crossing is clear before closing the gates to pedestrian / vehicular traffic;
- Once the gates are closed and secured, the second member of traincrew would instruct the train driver to proceed by radio link, monitoring the progress of the train over the crossing until the tail of the train has cleared;
- At this point, the second member of traincrew would radio the train driver to stop, in order that the second member of traincrew can secure the gates in the open position to pedestrian / vehicular traffic, walking forward to rejoin the locomotive to allow the train to proceed again.

3.3.11 Including the time taken to stop and restart at the three at-grade crossings, the total transit time for each train in each direction between Dragonby Sidings and the Project is likely to be around 30-45 minutes.

3.3.12 The proposed ERF railhead (Appendix B Drawing 6) would comprise a handling apron of 0.9 Ha in size, 400m in length and 25m in width, together with two handling sidings and a third locomotive release siding running parallel and to the west of the apron. This would enable a train to be brought to site and split into two half portions for handling by reachstacker cranes. The Project constraints require that the ERF rail sidings and railhead are constructed on a curved alignment, necessitating use of reachstackers rather than overhead gantry cranes. Once the train is berthed, the reachstackers would unload and reload containers from both halves of the train (the vehicles being able to reach over one half to reach the other half), each container placed onto an IMV to shuttle to and from the ERF on the internal estate road network. The handling apron provides space for the IMV to turn at each end and to temporarily store up to 223 empty containers (2 rows of 55 containers stacked up to 2 high), to ensure a suitable supply is available within the circuit between the ERF and originating fuel loading points.

3.3.13 Once the train has reached the ERF railhead, the train would proceed through the railhead to the point where the rear half of the train would then within the length of one of the two proposed handling sidings within the railhead. The train would then be split at the halfway point, the locomotive pulling the front half of the train clear of the rear half, shunting the front half back into the second of the handling sidings within the railhead, the train then being berthed with the two halves immediately adjacent to each other (Appendix A Figure 5).

3.3.14 The timing of trains to and from the Project would be determined by the Applicant, train operator, Network Rail and the fuel supplier, in order to optimise the transit times between origin(s) and destination, taking advantage of quieter periods on the surrounding national rail network (see next section).

4 Wider rail network access

4.1 Baseline conditions

4.1.1 As noted earlier, the Flixborough branch line has not carried trains since at least 2012, the baseline analysis therefore focusses on Dragonby Sidings, the Roxby Gullet to Scunthorpe branch line and the connecting main line from Scunthorpe to Thorne Junction.

4.1.2 The Dragonby Sidings yard has seen occasional use in recent years, the owners Vossloh Cogifer (who produce track components) intend to make use of the yard and main line connection to supply Network Rail with materials as required. The associated movements are expected to be in the order of several trains per week.

4.1.3 The Roxby Gullett to Trent Junction branch line is currently primarily used for freight train movements to and from the BIFFA landfill site at Roxby. Analysis of Network Rail's Working Timetable (WTT) at the time of writing (23/09/21) indicates some 2 trains per day arrive and depart Roxby, the first scheduled to arrive at 06:00 and depart at 10:33, the second scheduled to arrive at 09:24 and depart at 12:23. Analysis of the previous week's WTT indicated between 1 and 2 trains operated along the branch line in each direction per day, timings varying around the schedule according to the nature of the operation.

4.1.4 As noted earlier, the Roxby branch line connects at Trent Junction with the main line through Scunthorpe, linking Wrawby Junction in the east with Marshgate Junction to the west. The main line is predominantly double-track throughout, with maximum line speeds of 88 km/h (55 mph) in each direction. The loading gauge on the main line and the entire route through to Flixborough Wharf is cleared to W8 standard, sufficient to enable the carriage of waste containers as used on existing rail services. The clearances on the Flixborough branch line have been checked independently to confirm this.

4.1.5 Network Rail's "Loads Manual" provides indicative information on the length and weight of freight trains for each section of the network, and for the section passing Trent Junction the indicative length is stated as 88 Standard Length Units (1 SLU = 6.4m) or 563 metres, and the indicative trailing weight (ie excluding the locomotive) ranges from 1,635mt for a Class 56 locomotive to 2,620mt for a Class 60 locomotive. This compares with the maximum train length of 548m and maximum trailing weight of 1,968mt.

4.1.6 The current WTT for the main line shows around 138 timetabled paths in total (broadly half in each direction), of which:

- 90 (65%) freight, reflecting the connectivity to Scunthorpe and the port of Immingham;
- 30 (22%) TransPennine Express (TPE) passenger services;
- 18 (13%) Northern Trains (NT) passenger services.

4.1.7 Of the total, 24 (17%) did not operate on the day in question, operating on an "as-required" (or "Q") basis, and 29 (21%) were cancelled.

4.2 Capacity for additional waste trains on the local rail network

4.2.1 Over the last two years the rail industry has operated a significantly-reduced timetable for passenger trains as a result of the COVID-19 pandemic. At the time of writing, provisional statistics produced by the DfT indicate passenger use of rail being around three-quarters of pre-COVID levels[3] with the Office for Rail & Road (ORR) reporting that rail freight traffic has now recovered to exceed pre-COVID levels.[4] The current level of passenger rail traffic on the network is expected to increase again as the lockdown rules are further eased, but the extent to which services fully recover to pre-COVID levels (or exceed these levels) has yet to be determined.

4.2.2 To determine the ability of the Project to receive and despatch up to 3 trains per day from the national rail network, an independent timetable study was undertaken by specialist consultants, working to a remit agreed with Network Rail, who also reviewed the report's findings on completion.

4.2.3 As the source of fuel for the ERF has yet to be established, it would not be possible to accurately predict the origin and destination information at this stage in the development. A similar point was acknowledged by the Secretary of State in a recent decision for a Strategic Rail Freight Interchange DCO application at Northampton Gateway.[5]

4.2.4 The study therefore used the May 2020 timetable to assess the ability of the network to accommodate trains moved from 3 "staging" points in the surrounding area (York, Milford Sidings and Doncaster) through which freight trains to and from the ERF might typically be routed before picking up onward paths to/from other staging points and origin/destination railheads.

4.2.5 The study (Appendix C) concluded:

[3] https://www.gov.uk/government/statistics/transport-use-during-the-coronavirus-covid-19-pandemic
[4] https://dataportal.orr.gov.uk/media/1997/freight-rail-usage-and-performance-2021-22-q1.pdf
[5] Northampton Gateway SRFI DCO decision letter, 9th October 2019, para 30

- It is feasible that 3 trains per day in each direction can serve the site, irrespective of whether the route chosen is to York, Doncaster or Milford;
- The amount of adjustment required to other services is minimal, and is minimal in the context of typical timetable changes. Typically it involves adjusting timings by moving existing pathing allowance in the timetable; the largest change affecting passenger is 1 minute and for freight is 3 minutes;
- Where there are critical interactions with other train paths, the performance risk associated with these interactions is low and in all cases suitable mitigations exist (e.g. alternative paths or swapping the orders of trains);
- Any of the three routes could be served by the required paths overnight, so this analysis has focused on the daytime period as a more realistic test;
- York is the hardest destination to serve, although three daytime paths were found in each direction. This is likely the maximum that can be delivered during the day based on the Timetable Planning Rules (TPR) due to constraints in the Colton Junction – York area. Both Doncaster and Milford have several different options available, with at least an hourly path likely to be available most of the time (depending mainly on which other freight paths operate);
- A qualitative performance analysis was undertaken for each path and where larger interactions were identified, potential solutions were proposed;
- Given these findings and the fact that only three trains per day in each direction are proposed to operate, the performance impact of the paths is likely to be negligible;
- Therefore, it can be confirmed that serving the terminal with at least 3 paths per day is feasible and is likely to have minimal impact on the existing railway and existing services.

4.2.6 Whilst no absolute certainty can be provided regarding capacity it is, on the balance of probabilities, feasible that the Project could be connected to the rail network and capable of being served by 3 trains per day. The uncertainty caused by likely constraints and competitions on the network and the unknowns regarding how the network will accommodate future growth has been set against the Government's ambition, set out in the National Policy Statement on National Networks (NPSNN), that it is important to facilitate the growth of the intermodal rail freight industry to support a low carbon sustainable system that is the engine for economic growth.[6]

[6] NPSNN paragraph 2.53

4.2.7 Network Rail's ability to provide the small number of additional paths required to serve the Project is unlikely to come at the expense of passenger services. One of the objectives of the Network Code[7] is to share capacity on the network for the safe carriage of passengers and goods. When compiling a timetable Network Rail must assess all operators' requirements together and not look at freight services after passenger service or vice versa. The commitment to facilitate additional rail freight in line with the NPSNN is noted and it is reasonable to assume that future investment (eg the Transpennine Route Upgrade currently in progress) would ensure capacity would be provided in future if required.

[7] The Network Code is a common set of rules and industry procedures that apply to all parties that have a contractual right of access to track owned and operated by Network Rail.

5 Preliminary Conclusions

5.1.1 In conclusion, the results of this assessment have indicated that the potential effects resulting from the increase in rail traffic generated by the Project are predicted to be minor or not significant with respect to the wider rail network.

6 References

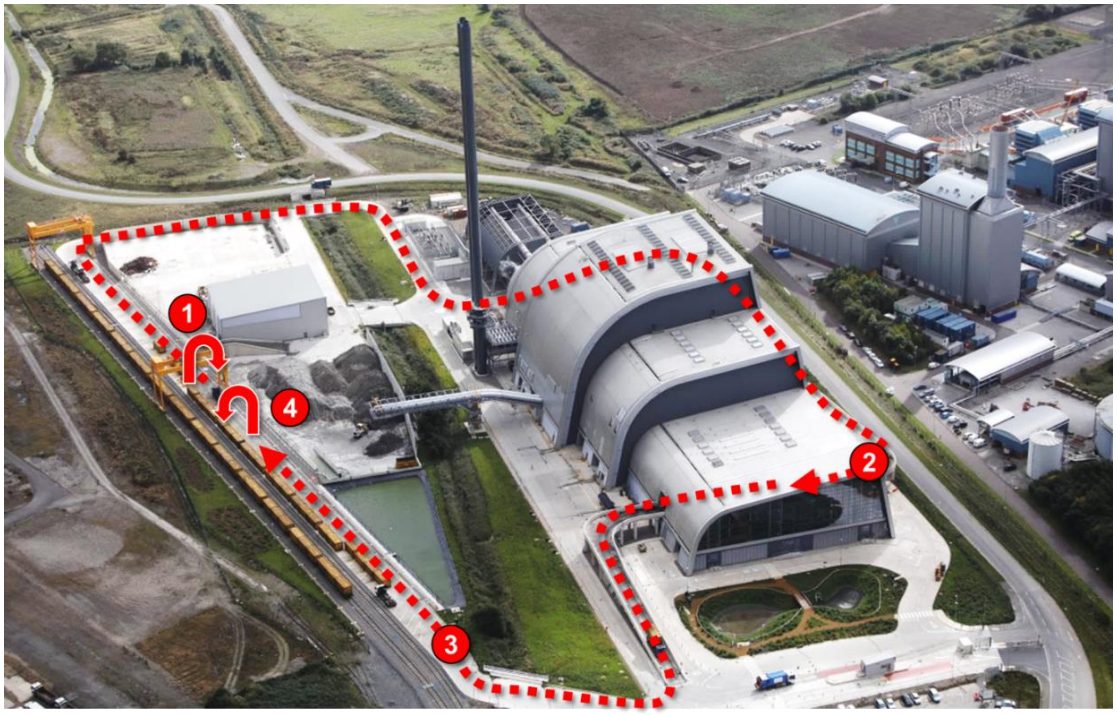
- National Networks National Policy Statement (DfT, 2014);
- National Planning Policy Framework (MHCLG, 2019);
- Overarching National Policy Statement for Energy (DECC 2011);
- National Policy Statement for Renewable Energy Infrastructure (DECC 2011);
- Rail Freight Strategy (DfT 2016);
- Decision Letter on Northampton Gateway SRFI DCO (DfT October 2019);
- Transport statistics (DfT 2021);
- Rail freight statistics (ORR 2021);
- Freight & National Passenger Operators Route Strategic Plan (Network Rail March 2019);
- London North Eastern & East Midlands Route Strategic Plan (Network Rail March 2019);
- The Network Code (Network Rail);
- Loads Manual (Network Rail);
- Sectional Appendix (Network Rail);
- Working Timetable (Network Rail).

Appendices

Appendix A Figures

Figure 1 Class 66 locomotive and train of waste containers

Figure 2 Handling operations at Severnside ERF



Key

1.Containers are unloaded from the train onto Internal Movement Vehicles (IMV);

2.IMVs travel along internal road network to tipping hall to discharge containers;

3.IMVs transport empty containers back to railhead;

4.Containers are loaded from IMVs onto train.

Figure 3 Railhead handling equipment

Reachstacker (foreground) and frontloader (background)

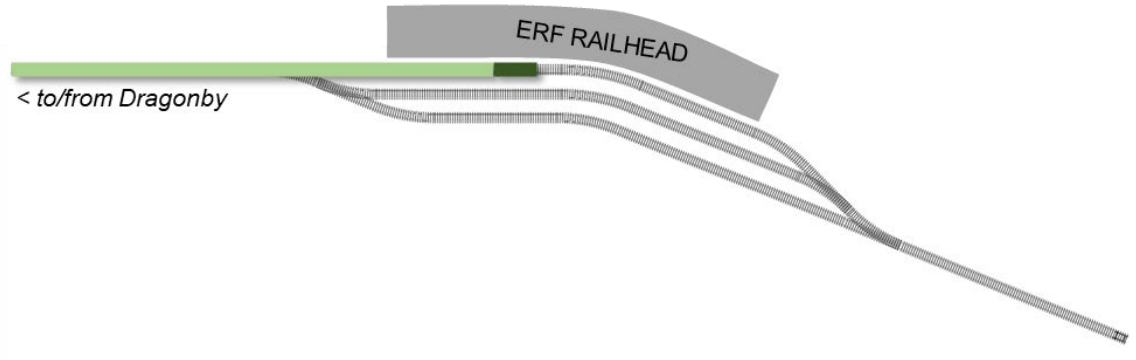
Internal Movement Vehicle (IMV)

Figure 4 Local rail network

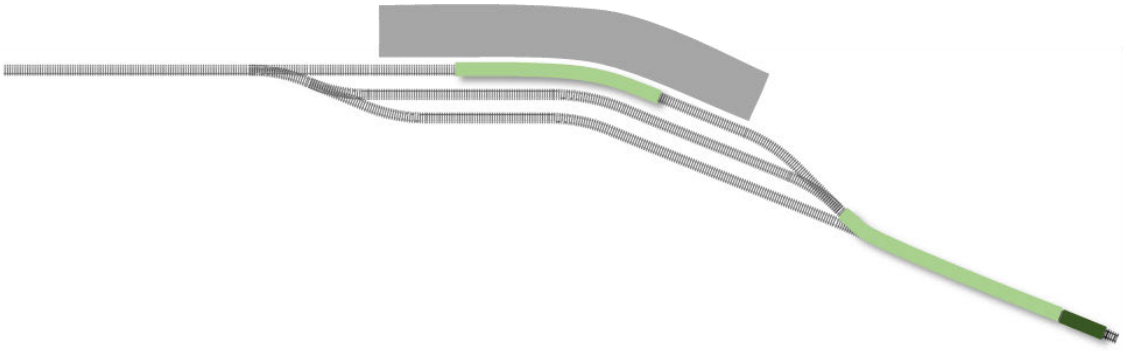
Figure 5 Sequence for inbound train to ERF railhead

Schematic layout, not to scale. Process reverses for outbound trains

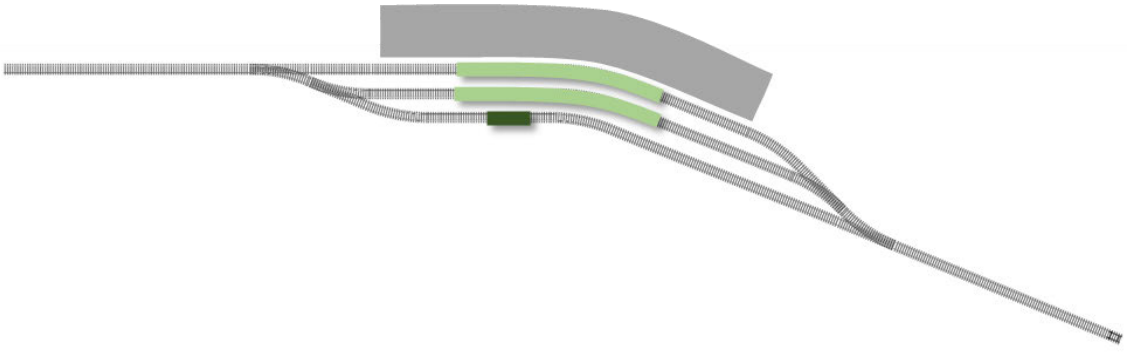
a) Train arrives into site



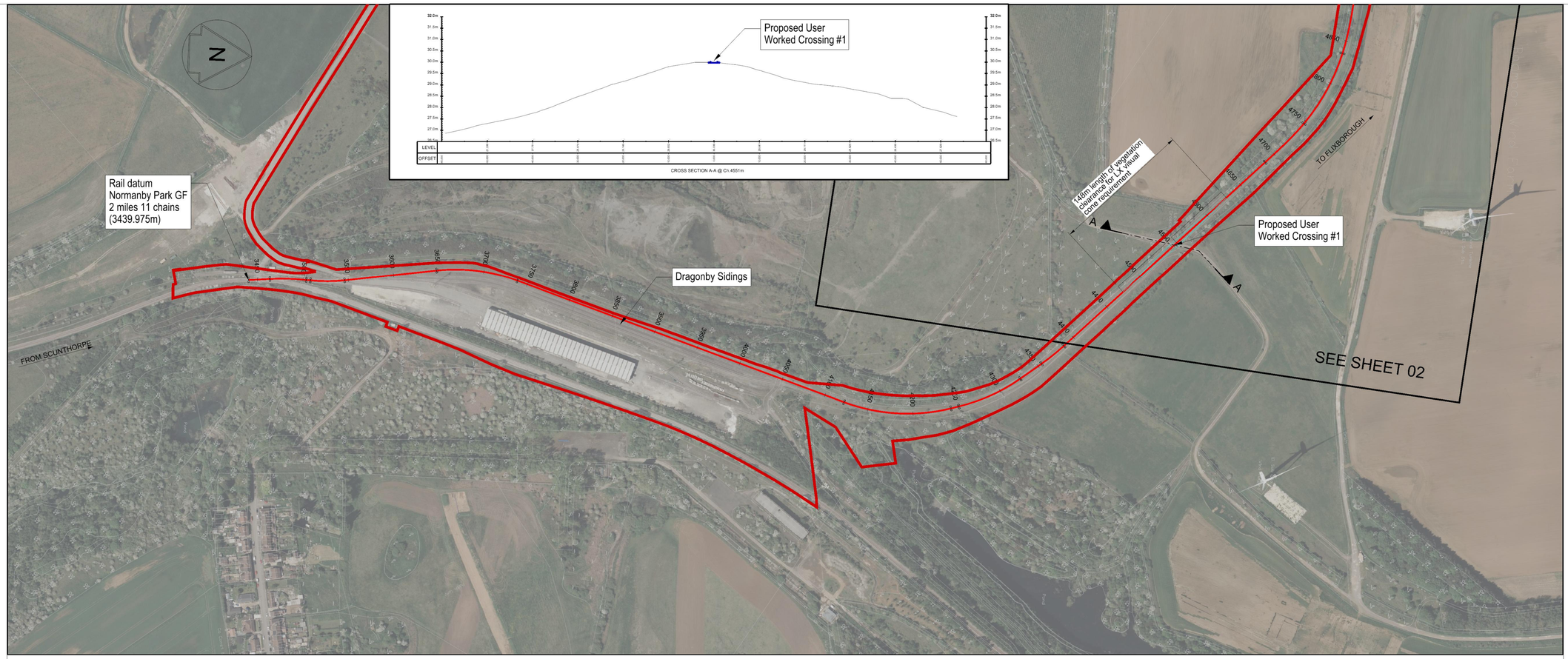
b) Train splits half way along its length, rear half berthed in railhead, front half drawn clear of rear half into southern "headshunt" siding



c) Front half shunted into second handling siding, locomotive released via third siding ready to reform train ahead



Appendix B Rail infrastructure plans



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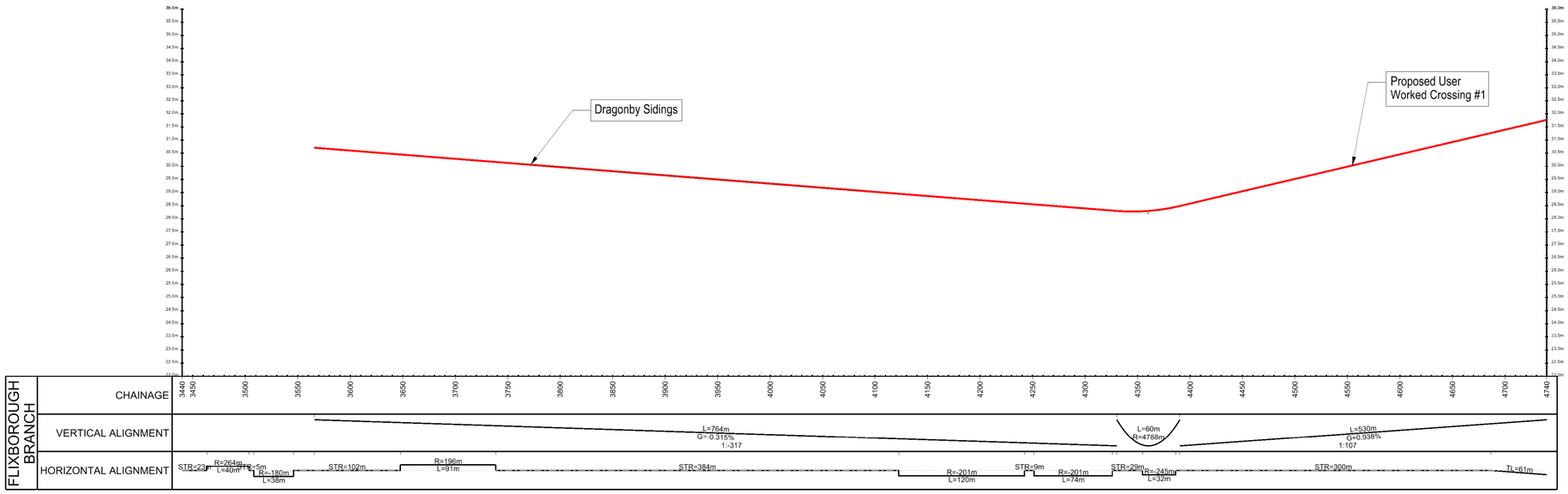

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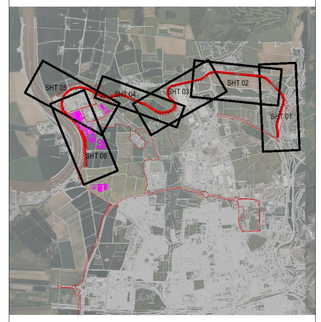

PLAN & LONG SECTION KEY
- Red Line Boundary
- Proposed Rail Centreline

Rev	Description	Date	Iss'd	Rev'd	App'd
P1	Planning - DCO Submission	05-22	AT	DP	NG
P0	Planning - DCO Submission	09-21	AT	DP	NG

DCO SUBMISSION

Project Stage

INFORMATION

Status of Drawing

Client

NORTH LINCOLNSHIRE GREEN ENERGY PARK

Level 33, Euston Tower, 286 Euston Rad, London, NW1 3DP

LDĀDESIGN GSDA ERM FICHTNER

BURO HAPPOLD northern planners bowland ecology arcadis

Client	*NORTH LINCOLNSHIRE GREEN ENERGY PARK LTD*
Consultant	*INTERMODALITY*
Project	**NORTH LINCOLNSHIRE GREEN ENERGY PARK**
Drg Title	RAIL OUTLINE FEASIBILITY PLAN & LONG SECTION SHEET 1

Planning Inspectorate No.	Scale@A1
EN010116	1:2500 (H) 1:100 (V)
Drawn/Designed By.	Checked By. / Approved By.
AT	DP / NG
Drawing No.	Revision
NLGEP-INT-XX-XX-DR-Y-0001	P1

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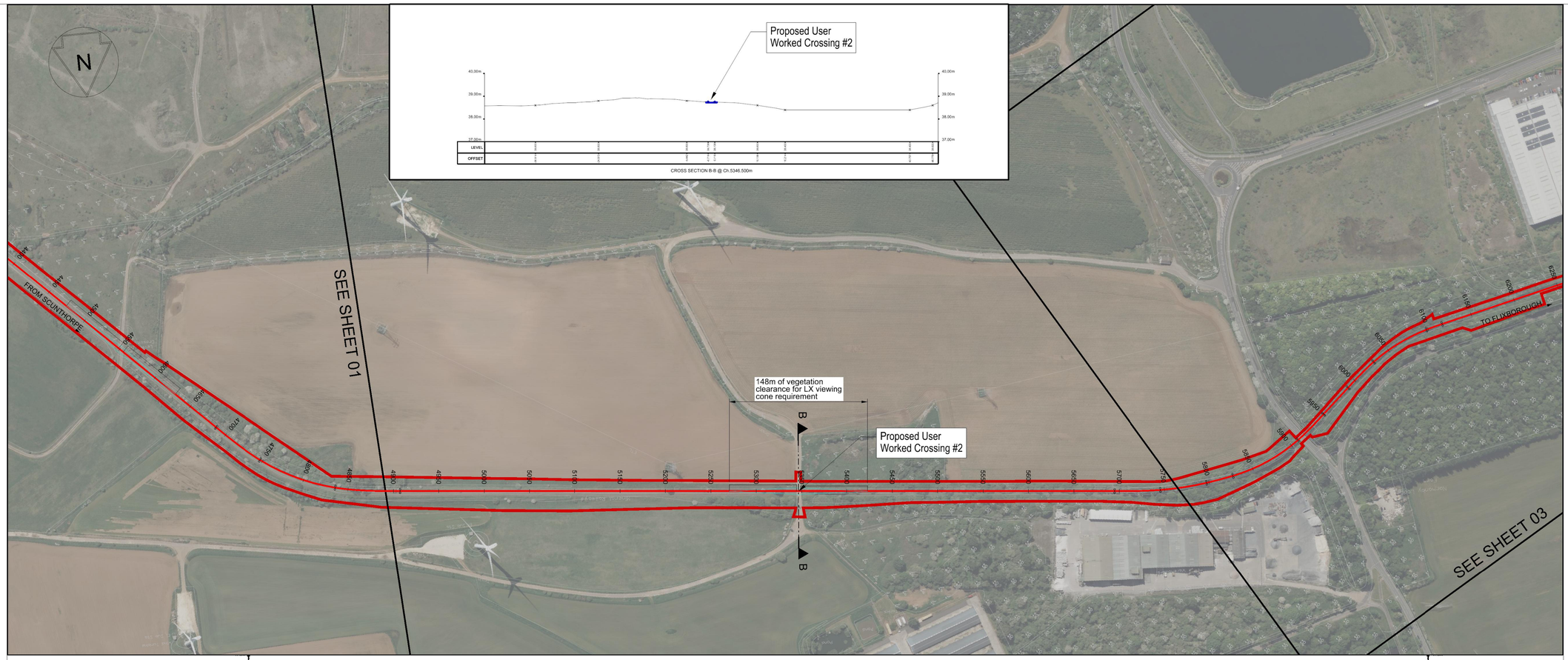

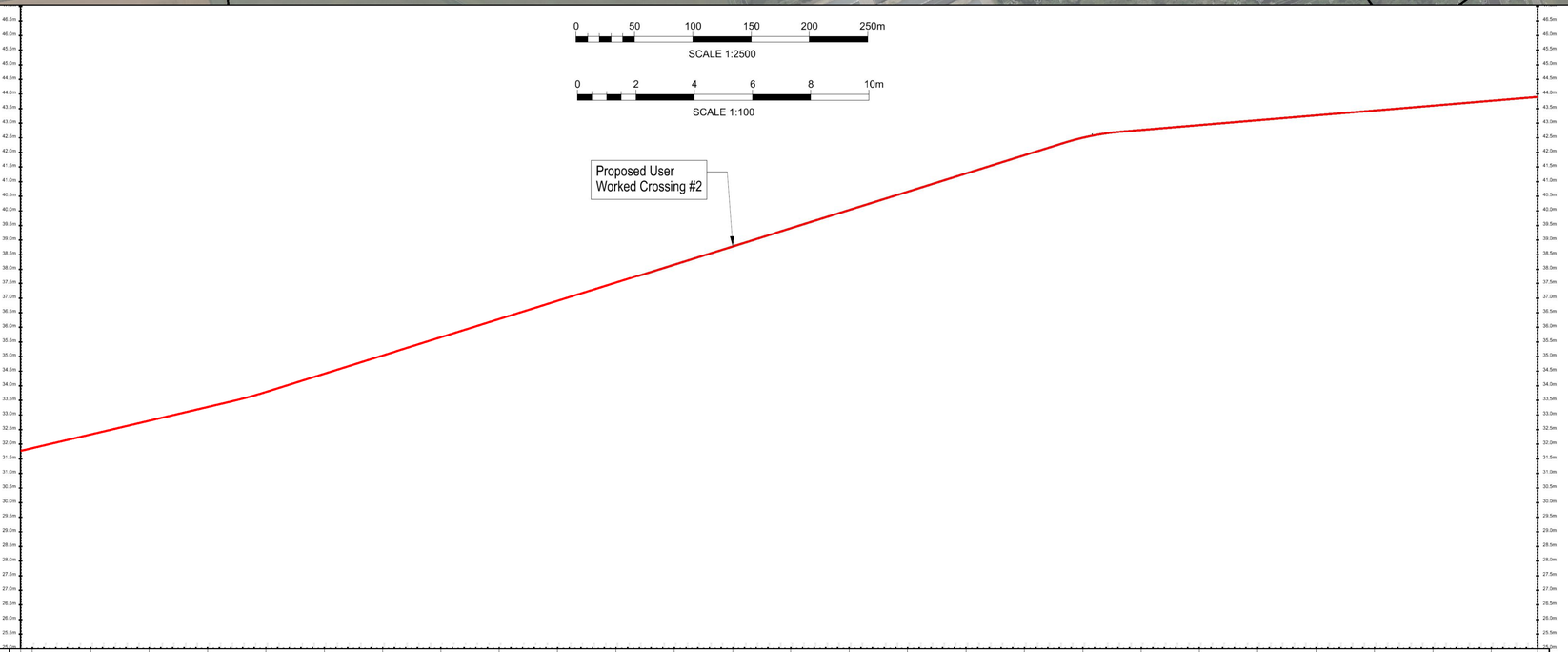

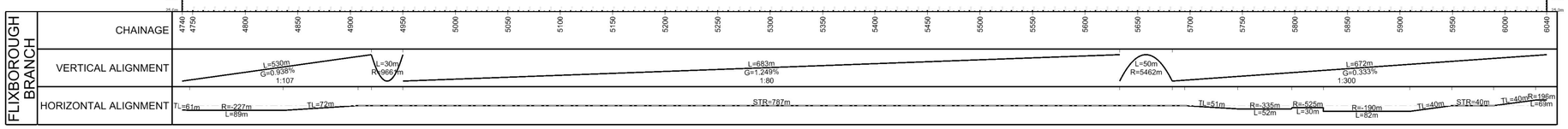

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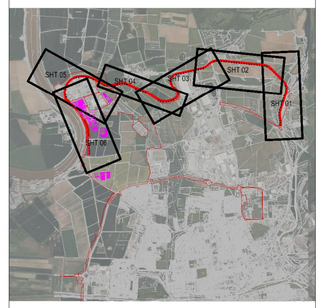

PLAN & LONG SECTION KEY
- Red Line Boundary
- Proposed Rail Centreline

Rev	Description	Date	Iss'd	Rev'd	App'd
P1	Planning - DCO Submission	05-22	AT	DP	NG
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Project Stage

INFORMATION

Status of Drawing

Client

NORTH LINCOLNSHIRE GREEN ENERGY PARK

Level 33, Euston Tower, 286 Euston Rad, London, NW1 3DP

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Client	*NORTH LINCOLNSHIRE GREEN ENERGY PARK LTD*
Consultant	*INTERMODALITY*
Project	**NORTH LINCOLNSHIRE GREEN ENERGY PARK**
Drg Title	RAIL OUTLINE FEASIBILITY PLAN & LONG SECTION SHEET 2

Planning Inspectorate No.	Scale@A1
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Drawing No.	Revision
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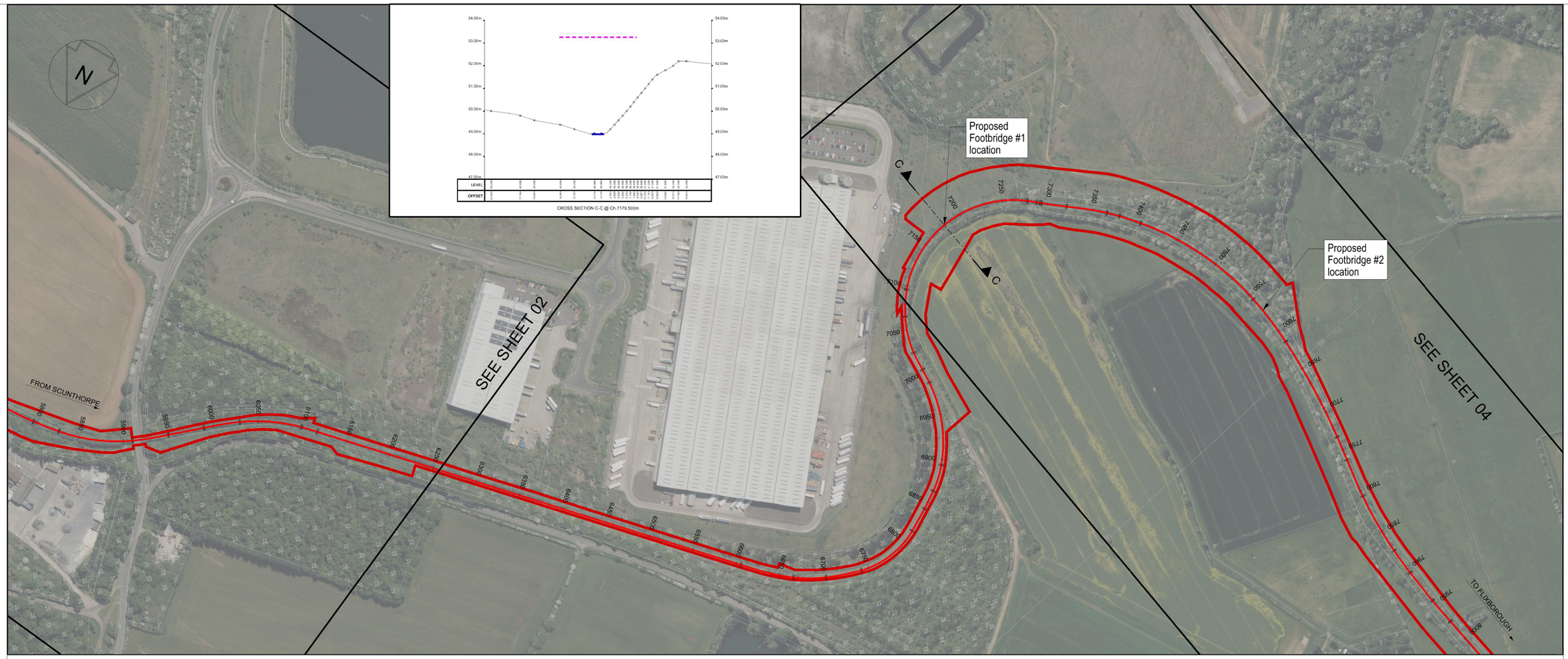

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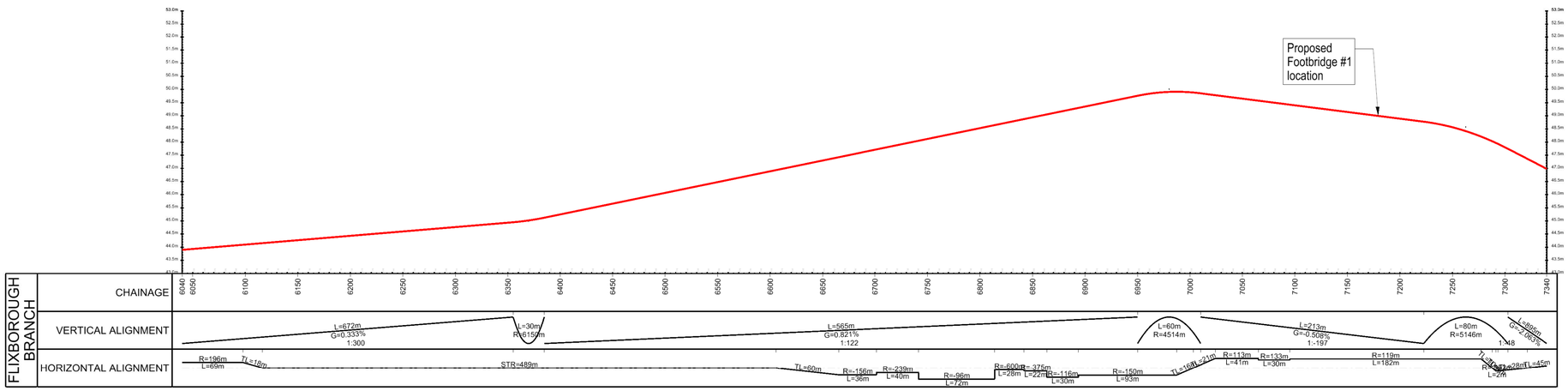

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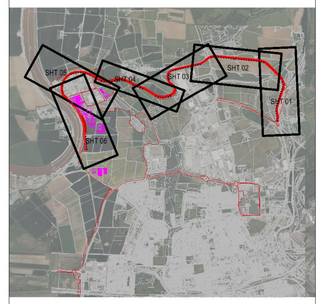

PLAN & LONG SECTION KEY
- Red Line Boundary
- Proposed Rail Centreline

Rev	Description	Date	Iss'd	Rev'd	App'd
P1	Planning - DCO Submission	05-22	AT	DP	NG
P0	Planning - DCO Submission	09-21	AT	DP	NG

DCO SUBMISSION

Project Stage

INFORMATION

Status of Drawing

Client

NORTH LINCOLNSHIRE GREEN ENERGY PARK

Level 33, Euston Tower, 286 Euston Rad, London, NW1 3DP

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Client	*NORTH LINCOLNSHIRE GREEN ENERGY PARK LTD*
Consultant	*INTERMODALITY*
Project	**NORTH LINCOLNSHIRE GREEN ENERGY PARK**
Drg Title	RAIL OUTLINE FEASIBILITY PLAN & LONG SECTION SHEET 3

Planning Inspectorate No.	Scale@A1
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Drawing No.	Revision
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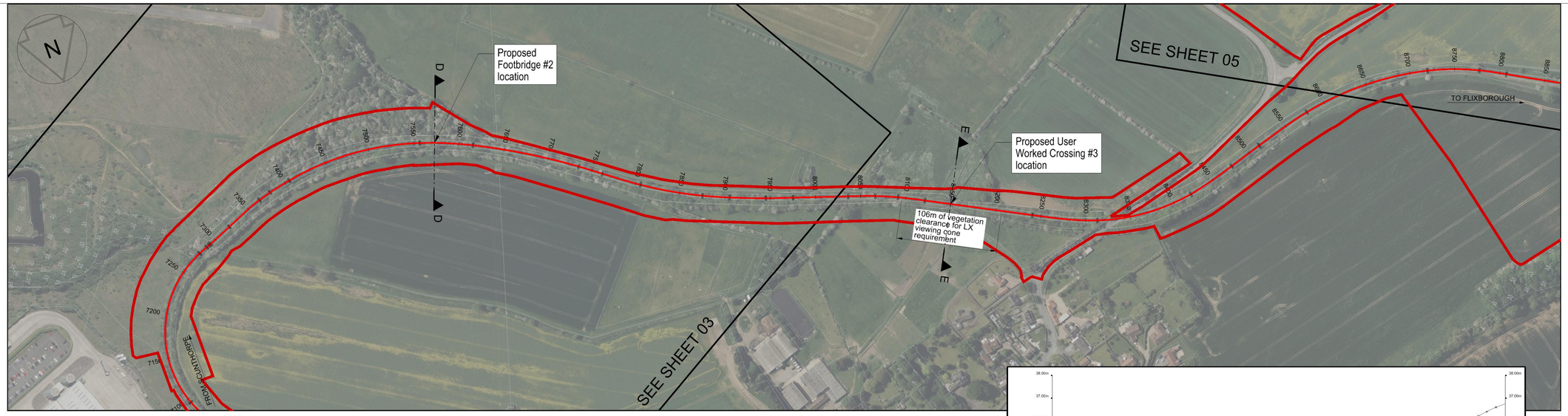

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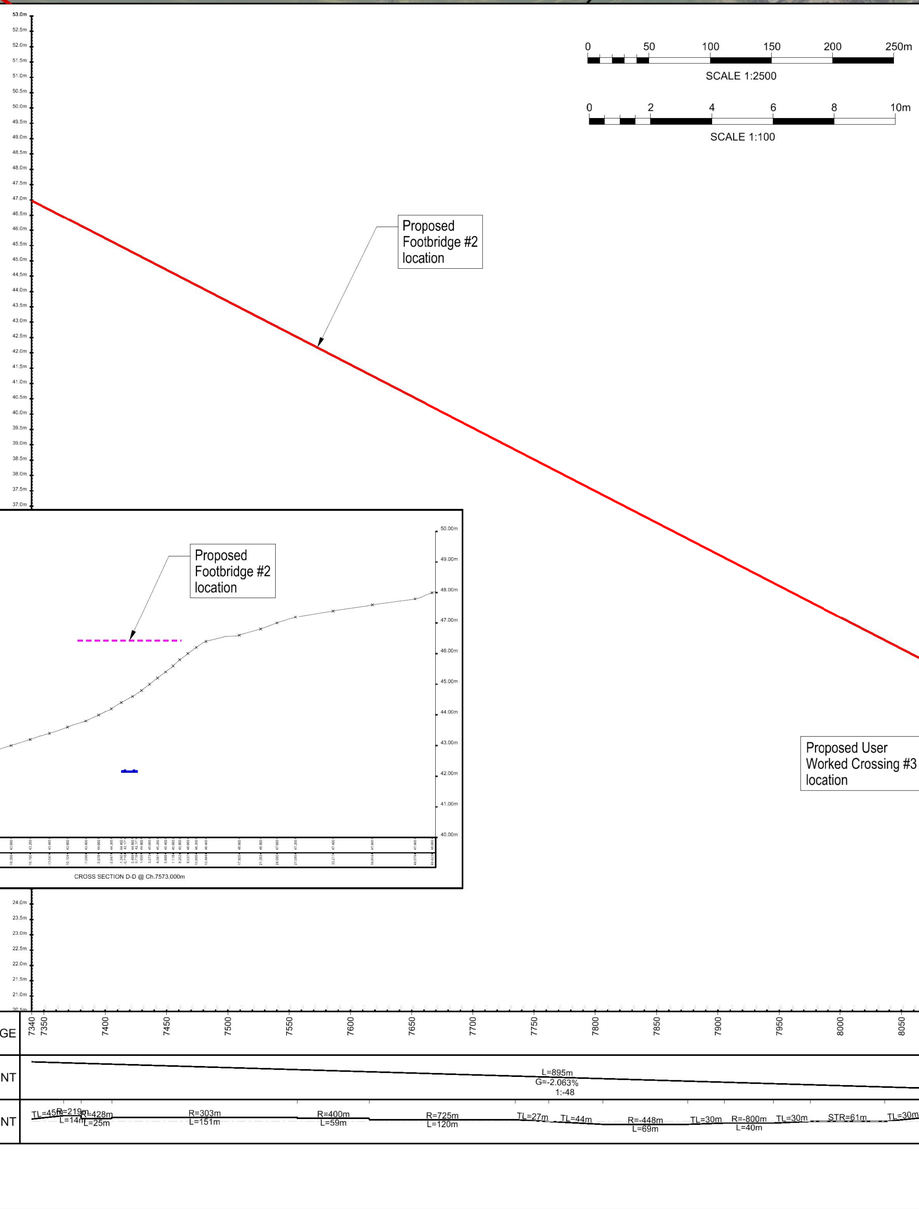

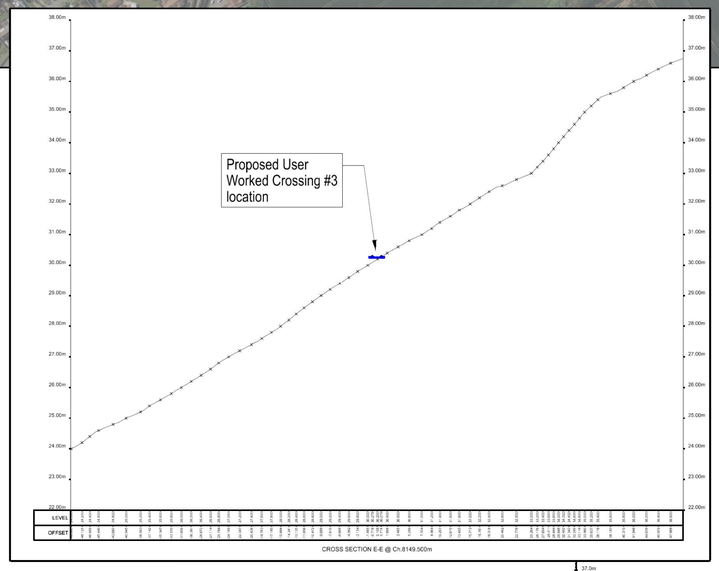

FLIXBOROUGH BRANCH

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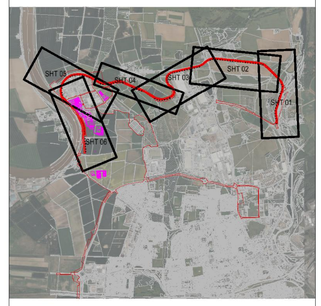

PLAN & LONG SECTION KEY
- Red Line Boundary
- Proposed Rail Centreline

Rev	Description	Date	Iss'd	Rev'd	App'd
P1	Planning - DCO Submission	05-22	AT	DP	NG
P0	Planning - DCO Submission	09-21	AT	DP	NG

DCO SUBMISSION

Project Stage

INFORMATION

Status of Drawing

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NORTH LINCOLNSHIRE GREEN ENERGY PARK

Level 33, Euston Tower, 286 Euston Rad, London, NW1 3DP

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Client	*NORTH LINCOLNSHIRE GREEN ENERGY PARK LTD*
Consultant	*INTERMODALITY*
Project	**NORTH LINCOLNSHIRE GREEN ENERGY PARK**
Drg Title	RAIL OUTLINE FEASIBILITY PLAN & LONG SECTION SHEET 4

Planning Inspectorate No. EN010116	Scale@A1 1:2500 (H) 1:100 (V)
Drawn/Designed By. AT	Checked By. DP
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Drawing No. NLGEP-INT-XX-XX-DR-Y-0004	Revision P1

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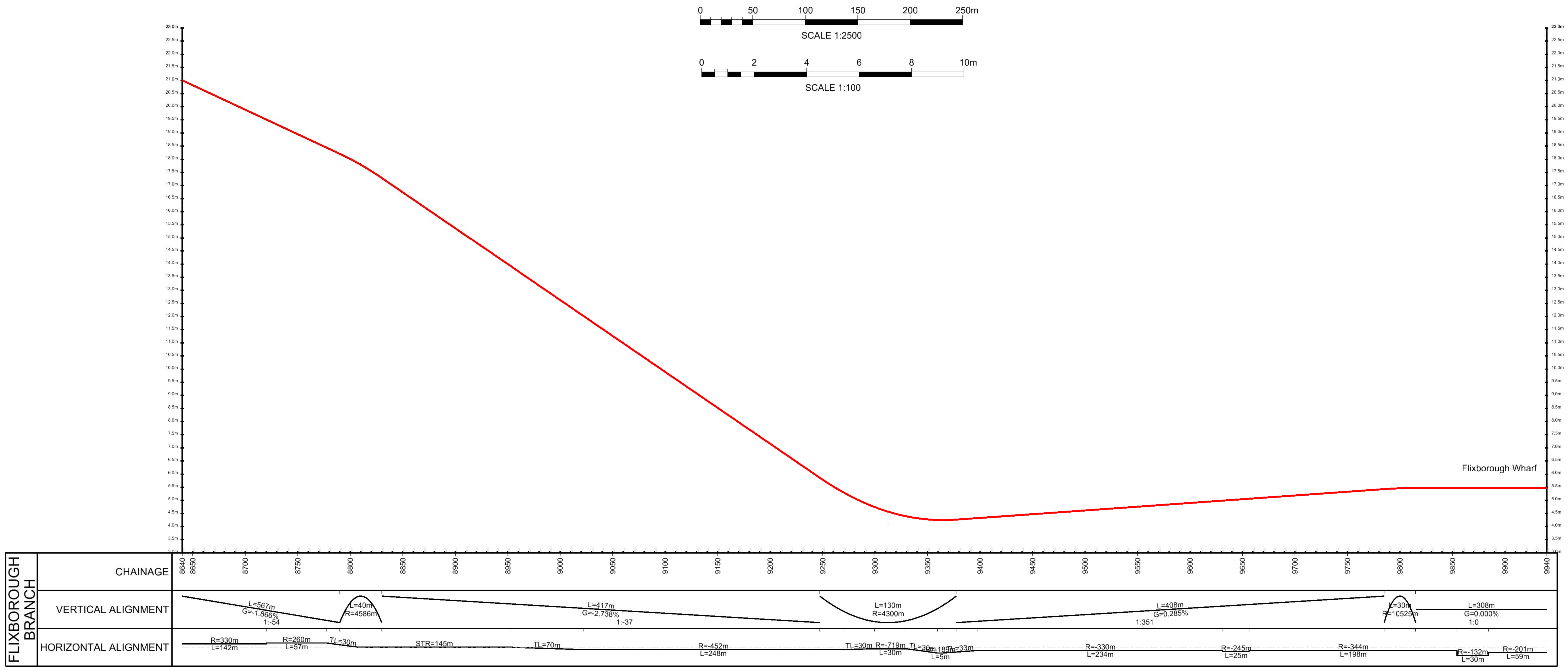

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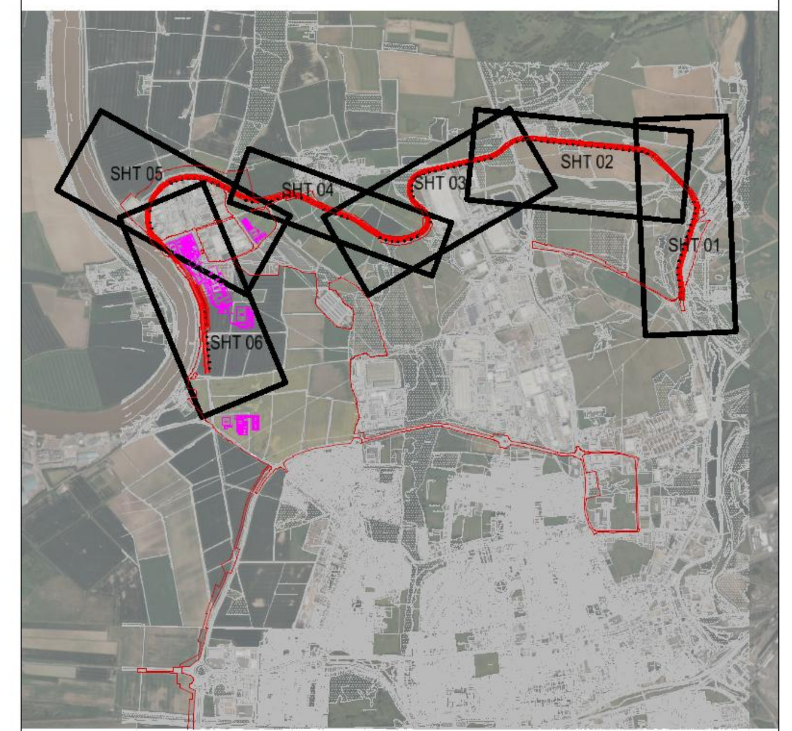

PLAN & LONG SECTION KEY
Red Line Boundary
Proposed Rail Centreline

Rev	Description	Date	Iss'd	Rev'd	App'd
P1	Planning - DCO Submission	05-22	AT	DP	NG
P0	Planning - DCO Submission	09-21	AT	DP	NG

DCO SUBMISSION

Project Stage

INFORMATION

Status of Drawing

Client

NORTH LINCOLNSHIRE GREEN ENERGY PARK
Level 33, Euston Tower, 286 Euston Road, London, NW1 3DP

Client: NORTH LINCOLNSHIRE GREEN ENERGY PARK LTD
Consultant: INTERMODALITY
Project: NORTH LINCOLNSHIRE GREEN ENERGY PARK
Drg Title: RAIL OUTLINE FEASIBILITY
PLAN & LONG SECTION
SHEET 5

Planning Inspectorate No.	Scale@A1
EN010116	1:2500 (H) 1:100 (V)

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AT	DP	NG

Drawing No.	Revision
NLGEP-INT-XX-XX-DR-Y-0005	P1

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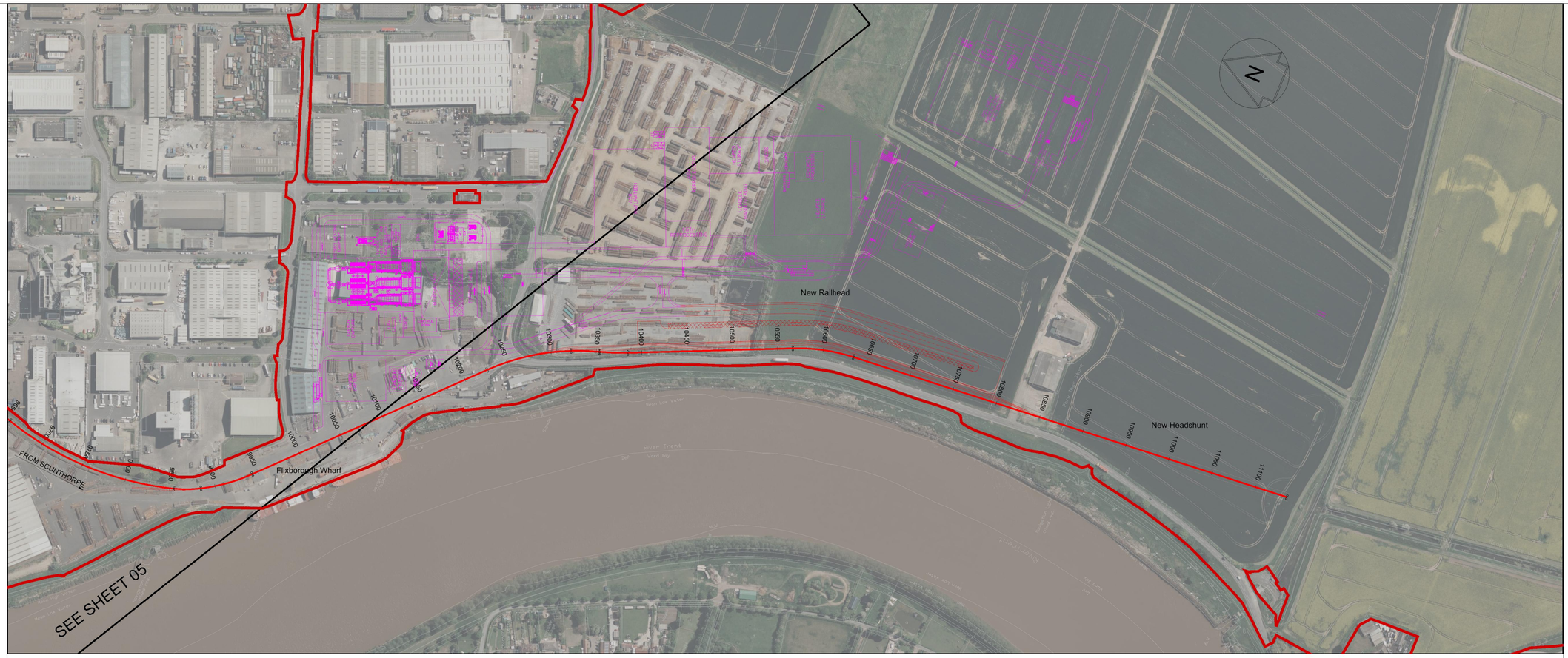

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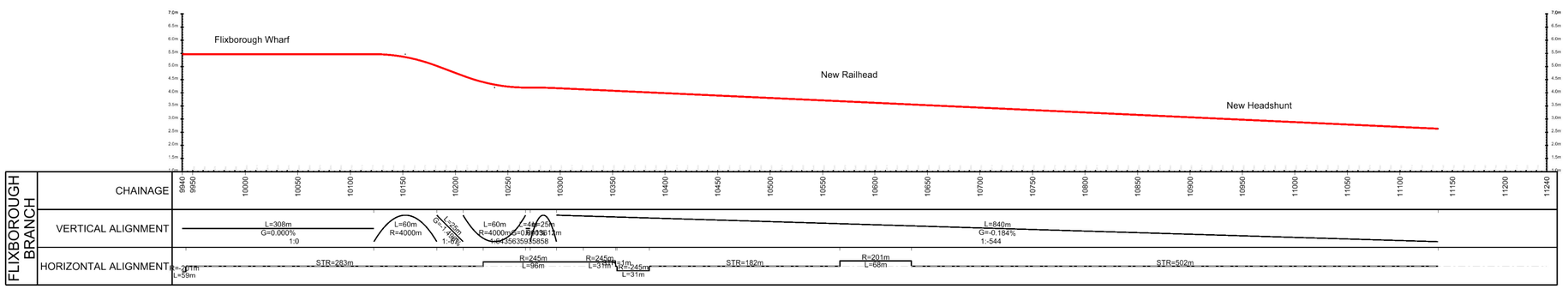

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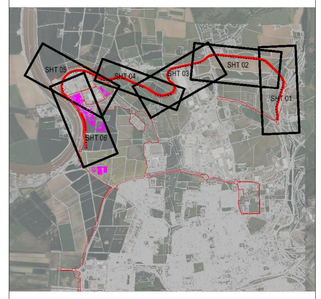

PLAN & LONG SECTION KEY
- Red Line Boundary
- Proposed Rail Centreline

Rev	Description	Date	Iss'd	Rev'd	App'd
P1	Planning - DCO Submission	05-22	AT	DP	NG
P0	Planning - DCO Submission	09-21	AT	DP	NG

DCO SUBMISSION

Project Stage

INFORMATION

Status of Drawing

Client

NORTH LINCOLNSHIRE GREEN ENERGY PARK

Level 33, Euston Tower, 286 Euston Rad, London, NW1 3DP

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BURO HAPPOLD northern planners bowland ecology arcadis

Client	*NORTH LINCOLNSHIRE GREEN ENERGY PARK LTD*
Consultant	*INTERMODALITY*
Project	**NORTH LINCOLNSHIRE GREEN ENERGY PARK**
Drg Title	RAIL OUTLINE FEASIBILITY PLAN & LONG SECTION SHEET 6

Planning Inspectorate No. EN010116	Scale@A1 1:2500 (H) 1:100 (V)
Drawn/Designed By. AT	Checked By. DP
Approved By. NG	
Drawing No. NLGEP-INT-XX-XX-DR-Y-0006	Revision P1

Appendix C **Timetable study**

North Lincolnshire Green Energy Park

Capacity Analysis

DOCUMENT CONTROL	
Project Title	North Lincolnshire Green Energy Park
Author(s)	Ed Jeffery
Version Number	1.0
Status	FINAL
Date	06/02/2022
Client	North Lincolnshire Green Energy Park

Version Number	Date	Issued By	Reason
0.1	06/08/2021	Ed Jeffery	First draft
1.0	06/02/2022	Ed Jeffery	Final version

Registered in England No. 09638982

1 Executive Summary

A timetable and capacity analysis study has been undertaken (based on the May 2020 timetable) looking at the opportunities to serve a new freight terminal at North Lincolnshire Green Energy Park, near Scunthorpe. The key findings are that:

- It is feasible that 3 trains per day in each direction can serve the site, irrespective of whether the route chosen is to York, Doncaster or Milford;
- The amount of adjustment required to other services is minimal, and is minimal in the context of typical timetable changes. Typically it involves adjusting timings by moving existing pathing allowance in the timetable; the largest change affecting passenger is 1 minute and for freight is 3 minutes;
- Where there are critical interactions with other train paths, the performance risk associated with these interactions is low and in all cases suitable mitigations exist (e.g. alternative paths or swapping the orders of trains).

Any of the three routes could be served by the required paths overnight, so this analysis has focused on the daytime period as a more realistic test.

York is the hardest destination to serve, although three daytime paths were found in each direction. This is likely the maximum that can be delivered during the day based on the Timetable Planning Rules (TPR) due to constraints in the Colton Junction – York area. Both Doncaster and Milford have several different options available, with at least an hourly path likely to be available most of the time (depending mainly on which other freight paths operate).

A qualitative performance analysis was undertaken for each path and where larger interactions were identified, potential solutions were proposed.

Given these findings and the fact that only three trains per day in each direction are proposed to operate, the performance impact of the paths is likely to be negligible.

Therefore, it can be confirmed that serving the terminal with at least 3 paths per day is feasible and is likely to have minimal impact on the existing railway and existing services.

2 Introduction

2.1 Background

North Lincolnshire Green Energy Park (NLGEP) is a proposed Energy from Waste facility at Flixborough Wharf, near Scunthorpe (see Figure 1 for proposed location).

Figure 1: Location of NLGEP, (Flixborough circled in red) (from OpenRailwayMap)

The site would potentially be served by rail for both inbound (fuel) and outbound (ash) traffic. The Flixborough branch line is a private branch line which would be reinstated and is connected to the existing Dragonby Sidings, and then on to Trent Junction near Scunthorpe. The line between Normanby Park Ground Frame (next to Dragonby Sidings) and Trent Junction is also currently used by several trains each day serving the landfill site at Roxby Gullet.

Typically, between 2 and 3 trains would serve the site in each direction. The origin / destination of these trains is not yet known and will be determined at a later stage.

2.2 Aim of analysis

To support the Development Consent Order (DCO) application, it is necessary to understand the feasibility of whether the site could be served by at least 3 trains per day (tpd). This analysis will consider (based on the May 2020 timetable) whether trains could serve the site by finding example paths between the site and several possible origin / destination locations.

The potential network performance impact of these new train paths will also be considered.

2.3 Key Assumptions

2.3.1 Geographic Scope

The proposed origin/destination locations of trains are:

- Doncaster (Belmont / Decoy / Hexthorpe yards);
- Milford Sidings;
- York South Sidings / Up Yard.

The geographic scope therefore covers these locations to Dragonby Sidings.

2.3.2 Infrastructure Assumptions

The infrastructure is per today, with the exception of the Flixborough Branch being reinstated and signalling enhancements on the line from Trent Junction. This line is currently operated as a single line with staff working, which requires intervals between trains of up to 45 minutes. It is assumed that, although it will remain single line, the signalling will be improved to increase the frequency of trains that can operate on the line and remove the staff working constraint.

Freight trains will need to run round (detach the locomotive from one end of the train and re-attach at the other end) to access the branch line as the connection to the main line face east. It is assumed that this can be done either using one of the Goods Lines at Trent Junction or in Trent Yard. Generally, for planning purposes, these locations are interchangeable and therefore the precise method of working is not critical to the findings.

2.3.3 Timetable assumptions

This analysis has used the May 2020 timetable as the start point (this is the most recent available timetable which does not contain reductions in service associated with COVID-19). A Wednesday weekday timetable is used to present an average day service timetable.

New trains are timed based on a Class 6 (60mph maximum speed) train hauling a 2200t trailing load. It is assumed that any route between origin and destination is acceptable, provided it is cleared to W8 gauge to accommodate the likely wagons that would be used on the service. It is possible that the return services would be lighter, but in the first instance they were tested as loaded as a 'worst case' scenario.

Three paths to/from each possible origin/destination are requested in every 24 hour period. It would be possible to operate all of these paths overnight when the passenger service levels are lower, but this is not a reasonable or realistic test. Therefore, some high level guidelines have been applied to the path which have been identified:

- Running between approximately 0500 and 2200;
- Different origins/destinations are treated as 'Y' paths (i.e. the same path can be used for each where they have common geography) provided at least 3 daily paths are available (e.g. a path between NLGEP and York can also be shared with a path between NLGEP and Milford, provided that there are at least two other paths per day available);
- A viable 'spread' of arrivals and departures (e.g. around 3 – 4 hours between consecutive arrivals from each origin, and the same between departures);
- No more than 2 trains on site at any time (based on operating to/from a specific origin/destination location).

Existing paths can be changed within the geographic area up to a maximum of 5 minutes (passenger) or 15 minutes (freight) and subject to the path being as booked at the model boundaries. In order of preference, this would be achieved by:

- Removing pathing time (allowance added to keep the trains compliant with the Timetable Planning Rules) or other non-mandatory allowances;
- Reducing dwell times where they are above the minimum required;
- Rerouteing trains where there is no substantial impact as a result.

Performance will be considered by identifying any key interactions with existing trains and using the Network Rail Performance Dashboard to see how those interacting trains typically

perform. This will be done using the median lateness based on the 50th percentile (i.e. what would happen on an 'average' day).

3 Timetable Findings

3.1 York – NLGEP

Out of all of the routes considered, these paths were the most difficult to accommodate. The routeing chosen was York – Colton Jn - Church Fenton – Gascoigne Wood – Hambleton – (East Coast Main Line) – Joan Croft Junction – Scunthorpe. The reason for this was:

- There were very few available paths for a loaded train using the direct route on the East Coast Main Line between Colton Junction and Joan Croft Junction, particularly when alignment of these paths with a suitable slot from York Yard South was considered (therefore necessitating the diversion *via* Church Fenton). Services that operate overnight could potentially use this route;
- There were suitable gaps on the East Coast Main Line between Hambleton and Joan Croft Junction, meaning it was not necessary to divert trains *via* Selby West Junction / Temple Hirst Junction to reduce interactions with passenger services.

The key section is between York Yard South and Colton Junction / Church Fenton. This is a four-track section of route, with the paths entering the route on the western (Leeds) pair of lines and needing to cross to the eastern most (Normanton) lines before Church Fenton; this can be done either at Colton North Junction or Colton South Junction. Trains departing York Yard South therefore cross all traffic on the Down Leeds line at Holgate Junction (York), require a clear path on the Up Leeds line as far as at least Colton North Junction and need a compliant crossing move onto the Normanton Lines, all before being caught up by the next train departing York on the Up Leeds lines. Based on the Timetable Planning Rules, the 'window' for doing this is:

- xx.00: passenger train departs York on the Up Leeds Line towards Colton Junction;
- xx.04: Latest time a passenger train can arrive at York on the Down Leeds line;
- xx.04: freight path departs York Yard South;
- xx.09: Earliest time next train can arrive at York on the Down Leeds line;
- xx.12: Approximate earliest time next Up Leeds passenger train can depart without catching up previous freight path before Colton Junctions.

This therefore requires a 12 minute 'window' in traffic on the Up Leeds line, and a 5 minute 'window' on the Down Leeds line that correspond with each other. There are several opportunities per hour that almost meet this requirement (typically being about 1 minute short), and these are often used by existing freight traffic from York Yard South (and are technically therefore non-compliant). To avoid planning non-compliant trains, only those opportunities which are within the parameters of this study and are compliant were used.

Three paths were identified that met this criteria, and this represents almost all of the path availability between about 0500 and 2200. Each path will now be described in turn.

0948 York Yard South Jn – Dragonby Sidings

There is a suitable path at Holgate Junction following 1V52 (0601 Glasgow – Plymouth) and before 2T09 (0918 Leeds – York) arrives. The path crosses onto the Normanton lines behind 1P18 (0843 Newcastle – Manchester Airport) and then runs to Hambleton South Junction without any further trains in proximity. At Hambleton South, it follows behind 1Y82 (1002 York – Kings Cross) and crosses in front of 1S08 (0830 Kings Cross – Edinburgh, which requires 30s pathing time moving from Colton Jn to Hambleton). At Joan Croft Junction, there is a small buffer between the train exiting and the next Up train (1A61 0844 Sunderland – Kings Cross).

The path has a 10 minute stop at Applehurst Junction to align the ECML path with the path through Thorne Junction, which will also serve as a performance buffer. The train follows 2P09 (1042 Doncaster – Scunthorpe) all the way to Scunthorpe. It arrives Dragonby sidings at 1205.

The key risk to performance is following 1V52 out of York. This train has a 50th percentile (median) lateness of 1 minute from York, and is therefore a good performing train. 1P18 has a median performance of 1.5 minutes late from York, and there is no path following on the Up Leeds line for over 10 minutes, so this is unlikely to be an issue.

At Hambleton South, 1Y82 has a median lateness of 2 minutes, but there is sufficient margin for the freight path to follow without this impacting further. Should the crossing move be missed, there is another path from Hambleton South to Scunthorpe 30 minutes later which could be used instead with minimal impacts on other trains. 2P09 has a median lateness of 0 minutes (i.e. on time) and therefore following this path is unlikely to cause any issues.

1355 York Yard South Jn – Dragonby Sidings

At Holgate Junction, this path crosses between 1E35 (1154 Liverpool Lime Street – Scarborough) and 1B26 (1122 Blackpool North – York, which is retimed 1 minute later to fit into the 'standard' hourly path). It has 4 minutes of pathing time before Gascoigne Wood Junction and then has a 20 minute stop at Hambleton South to align the path out of York with that on the ECML. It follows 1O40 (1335 Newcastle – Guildford), passing Joan Croft Junction at slightly greater than minimum headway in front of 1E15 (0952 Aberdeen – Kings Cross).

There is an 11 minute stop at Applehurst Junction, before the train follows 1W47 (1457 Sheffield – Scarborough) at Thorne Junction (which has 1 minute of pathing time moved to Thorne Junction). The train arrives at Dragonby Sidings at 1636.

The key risk is again missing the slot at Holgate, however 1E35 has a median lateness at Colton Junction of -3 minutes (i.e. early), so this is likely to be relatively low risk. 1O40 has a median lateness at Hambleton of 0 minutes (i.e. on time); the freight path can be held at Hambleton to follow 1E15 if required with minimal knock-on impact to other trains. 1W47 has a median lateness of 0.5 minutes at Thorne Junction, and if necessary the freight path can be run early from Applehurst in front of 1W47 without impact.

2114 York Yard South Jn – Dragonby Sidings

At Holgate Junction, this train crosses behind 9E19 (1925 Liverpool Lime St – Newcastle) and follows 2T32 (2109 York – Leeds); it crosses at Colton South Junction before it is caught up by 1B45 (2123 York – Blackpool North). It is held 6 minutes at Hambleton to follow another freight path, 6B80 (1746 North Blyth – West Burton) and has an unobstructed path to Dragonby, arriving at 2321.

9E19 has a median lateness at Colton Junction of 3 minutes. 2T32 has a median lateness from York of 1 minute, which means there is a risk on a median day to 9E19. However, should this be an issue, there is an alternative path approximately 20 minutes later (following 1P94 2034 Scarborough – Manchester Airport) which (with the pathing stop at Hambleton omitted) would be viable to Dragonby with minimal impacts to other services.

3.2 NLGEP – York

The routeing of these services is the inverse of the York – NLGEP paths. They are easier to accommodate in the Colton Junction – York area, as there is only one conflicting crossing move (with trains on the Up Leeds line at Colton North or South Junction). There are multiple possible paths available, so the ones with the best 'spread' of services have been used

0505 Dragonby – York Yard South Jn

This path is timed to form a 'pre-peak' arrival into York at 0745. At Thorne Junction, this path runs between 4L66 (0552 Goole – March) and 2C03 (0553 Hull – Adwick). It runs straight onto the ECML at Joan Croft Junction behind 1Y05 (0526 Newcastle – Kings Cross) and has a large margin both there and at Hambleton before the next train. A 4 minute stop is included at Hambleton to align the paths and also provides a performance buffer. At Colton Junction the train follows 1P61 (0537 Manchester Airport – Redcar), but at greater than the minimum headway. The following path is another freight path, 4S03 (0642 Doncaster Down Decoy – Killoch).

4L66 has a median lateness of -1 minute (i.e. early) and will therefore not typically interact. 1Y05 has a median lateness of 2.5 minutes at Temple Hirst Junction, which will not cause an issue (the following train is sufficiently far behind and the stop at Hambleton can be removed). If 1Y05 is later, the freight train can be run first without problem. 1P61 has a median lateness at Colton Junction of 0 minutes and therefore should not typically interact.

1215 Dragonby – York Yard South Jn

This path follows 2P12 (1248 Scunthorpe – Doncaster) to Hatfield & Stainforth, and then has an 8 minute pathing stop at Joan Croft Junction. It follows 1W96 (1200 King Cross – Inverness) but has a large gap before the following train. There is another 4 minute pathing stop at Hambleton and has 6.5 minutes of pathing time between Church Fenton and Colton Junction to cross behind 1F68 (1334 Scarborough – Liverpool Lime Street); there is a large gap to the following train. 1 minute of pathing in 2R98 is moved to approaching Colton Junction. The train arrives at 1444.

2P12 has a median lateness of 0 minutes from Scunthorpe, so there is minimal risk to following this train. Similarly, 1W96 has a median lateness of -0.5 minutes (early) at Shaftholme Junction; should this train be later, there is sufficient margin for the freight path not to impact the following train or the order of trains can be swapped.

1F68 has a 1.0 minute median lateness departing York; should it be later, the pathing time in the freight train would allow the paths to be swapped at Colton Junction.

1710 Dragonby – York Yard South Jn

From Scunthorpe, this train follows 2P22 (1748 Scunthorpe – Doncaster) to Hatfield & Stainforth, where it crosses behind 2C73 (1805 Doncaster – Hull). There is a 6 minute pathing stop at Joan Croft Junction before the train follows 1S26 (1700 Kings Cross – Edinburgh); there is a large gap to the following train.

A 5 minute pathing stop is included at Hambleton, and the train is also held at Colton Junction to cross behind 1F78 (1834 Scarborough – Manchester Victoria). The train arrives at 1946.

2P22 has a median lateness at Scunthorpe of -1.0 minute, and 2C73 is also typically early (-0.5 minutes). 1S26 has a median lateness of 0.0 minutes at Shaftholme Junction. 1F78 has a median lateness of 1.5 minutes at Colton Junction; the freight train can be held to follow without impact, or the order can be swapped by departing the freight path earlier.

3.3 Milford Sidings – NLGEP

The trains from Milford Sidings are the least constrained; they are routed the same as the York paths between Gascoigne Wood Junction and Dragonby, and therefore need a path on the ECML and through Thorne Junction. This is relatively straightforward compared to pathing the trains in and out of York.

The paths used are timetabled as 'Y' paths with the York paths and therefore are common between Gascoigne Wood Junction and Dragonby. However, there are more daily paths available that could be used if required (an hourly path in most hours).

As they share the majority of the route with the York paths, the description and performance risks associated with these paths are the same. No additional impacts are introduced in the section between Milford and Gascoigne Wood.

As a summary, the paths included are therefore:

- 1006 Milford West Sidings – Dragonby, arrive 1205;
- 1417 Milford West Sidings – Dragonby, arrive 1636;
- 2132 Milford West Sidings – Dragonby, arrive 2321.

3.4 NLGEP – Milford Sidings

The paths in this direction are also 'Y' paths with the York trains and therefore the impacts are the same, as described in section 3.3. It is assumed these paths use Milford West Sidings by running to Milford Junction and then propelling into the sidings.

The paths used are:

- 0505 Dragonby – Milford West Sidings, arrive 0730;
- 1215 Dragonby – Milford West Sidings, arrive 1422;
- 1710 Dragonby – Milford West Sidings, arrive 1922.

3.5 Doncaster – NLGEP

The specification required paths to any of Doncaster Decoy Yard, Belmont Yard or Hexthorpe Sidings. Doncaster Down Decoy sidings have been used here as these represent the 'worst case' in terms of capacity constraint.

There are two possible routes:

- Decoy Yard – Doncaster station – Bentley Jn – Thorne Jn – Scunthorpe;
- Decoy Yard – Doncaster station – Adwick – Applehurst Jn – Thorne Jn – Scunthorpe.

The first route requires trains to cross Doncaster station on the flat (conflicting with almost all other routes), but then has a relatively straightforward path to Scunthorpe. The second route means that trains cross trains to/from Sheffield at Doncaster, but interact minimally with other trains; however they must then interact with trains terminating at Adwick, which shunt onto the curve at Skellow Junction to reverse. For trains from Doncaster, the first routeing is used here as there is an hourly path available crossing Doncaster station for much of the day (except when used by other freight paths).

0942 Doncaster Down Decoy – Dragonby

This train runs onto the Fast (Through) line at Doncaster station in a relatively large gap (7 minutes after the previous arrival, 1D05 (0803 Kings Cross – Leeds) , and is then held to cross behind 1A19 (0946 Leeds – Kings Cross). This is in a window in traffic before 1E04 (0656 Edinburgh – Kings Cross) arrives. The train then has pathing to cross behind 1J43 (0839 Bridlington – Sheffield) at Thorne Junction and then follows 2P07 (0942 Doncaster – Scunthorpe). It arrives at 1107.

1D05 typically arrives at Doncaster 1 minute early, and 1A19 has a median arrival lateness at Doncaster of 2.0 minutes. This could delay the Edinburgh train, although this has a median arrival lateness of 5.5 minutes so would not impact most days. If the Leeds train is late, there is also an opportunity to swap the paths around. 1J43 is typically on time at Thorne Junction, as is 2P07. Therefore the overall risk is low.

1542 Doncaster Down Decoy – Dragonby

This train uses the same standard path through Doncaster, following 1D17 (1403 Leeds – Kings Cross) and crossing between 1A37 (1515 Leeds – Kings Cross) and 1E16 (1300 Edinburgh – Kings Cross). It then has pathing time to follow 2P21 (1542 Doncaster – Scunthorpe). It arrives at 1705.

1D17 has a median arrival at Doncaster of 2 minutes early, and 1A37 of 2 minutes later. However, as 1E16 has a median arrival lateness of 4.5 minutes, this is also unlikely to be an issue. The order of paths can also be swapped. 2P21 is typically 0.5 minutes late at Thorne Junction and 1 minute late at Scunthorpe; therefore, this will not significantly impact.

1843 Doncaster Down Decoy – Dragonby

This train also used the same standard path. It follows 1D23 (1703 Kings Cross – Leeds) and crosses between 1A46 (1736 Harrogate – Kings Cross) and 1E22 (1600 Edinburgh – Kings Cross). It has pathing time to cross behind 1J52 (1700 Scarborough – Sheffield) at Thorne Junction, and then follows 2P27 (1842 Doncaster – Scunthorpe), arriving at 2006.

1D23 has a median arrival at Doncaster of 1 minute early, and 1A46 of 3 minutes late. However, as for the other paths, this is offset by 1E22 being 6 minutes late on arrival. 1J52 is typically on time at Thorne Junction, and 2P27 is 1 minute late at both Thorne Junction and Scunthorpe.

3.6 NLGEP – Doncaster

The same routeing options apply as for the opposite direction. However, there is not a consistently available path crossing the station at a useable time, and therefore the path *via* Adwick is preferred, with trains timed to avoid times when both running lines at Skellow Junction are blocked with reversing trains.

0740 Dragonby – Doncaster Down Decoy

This train runs in a clear path as far as Hatfield & Stainforth, where it crosses behind 2P05 (0844 Doncaster – Scunthorpe). To link up with a path into Doncaster, 13 minutes of extra time is required, and this is shown as a stop at Applehurst Junction. It follows 2R17 (0925 Adwick – Sheffield) into Doncaster station and is held on the Goods Lines to cross behind 2R16 (0906 Sheffield – Adwick). It arrives at 0953.

2P05 is typically 0.5 minutes early at Hatfield & Stainforth, and 2R17 is ontime between Adwick and Doncaster. 2R16 is typically 0.5 minutes late at Doncaster which will therefore not impact the freight path.

1215 Dragonby – Doncaster Down Decoy

This train has a clear path as far as Applehurst, where it is then timed to wait. It follows 5C69 (1309 Doncaster – Doncaster, retimed 1 minute earlier from Skellow Jn)) into Doncaster and waits on the Goods Lines to cross behind 1E36 (0947 Southampton – Newcastle). It arrives at 1423.

5C69 is typically ontime departing Skellow Junction as it has a significant wait to reverse. 1E36 is typically 2 minutes late arriving at Doncaster, however this is enough to reverse the order of trains and run the freight path first without further impact.

1753 Dragonby – Doncaster Down Decoy

This train has a clear path to Hatfield & Stainforth, where it is held to cross behind 1J52 (1700 Scarborough – Sheffield). The stop at Applehurst Junction is consequently reduced, and the train follows 2R57 (1924 Adwick – Sheffield) into Doncaster. It is then held on the Goods Lines to cross behind 2R56 (1905 Sheffield – Adwick).

1J52 is typically on time when it crosses the freight path, as is 2R57 as it starts at Adwick. 2R56 has a median lateness of 1.0 minute at Doncaster, which would not impact the freight path.

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4 Conclusions

A timetable and capacity analysis study has been undertaken (based on the May 2020 timetable) looking at the opportunities to serve a new freight terminal at North Lincolnshire Green Energy Park, near Scunthorpe. The key findings are that:

- It is feasible that 3 trains per day in each direction can serve the site, irrespective of whether the route chosen is to York, Doncaster or Milford;
- The amount of adjustment required to other services is minimal, and is trivial in the context of typical timetable changes. Typically it involves adjusting timings by moving existing pathing allowance in the timetable; the largest change affecting passenger is 1 minute and for freight is 3 minutes;
- Where there are critical interactions with other train paths, the performance risk associated with these interactions is low and in all cases suitable mitigations exist (e.g. alternative paths or swapping the orders of trains).

4.1 Timetable Findings

Any of the three routes could be served by the required paths overnight, so this analysis has focused on the daytime period as a more realistic test. The outputs are summarised in Table 1.

Origin/Destination	Number of paths	Ease of pathing	Performance Risk
York Yard South	3 each direction	Difficult	Low
Doncaster Decoy	3 each direction	Intermediate	Low
Milford	3 each direction	Straightforward	Low

Table 1: Summary of timetable findings

York is the hardest destination to serve, although three daytime paths were found in each direction. This is likely the maximum that can be delivered during the day based on the Timetable Planning Rules (TPR) due to constraints in the Colton Junction – York area. Both Doncaster and Milford have several different timetable options available, with at least an hourly path likely to be available most of the time (depending mainly on which other freight paths operate).

At the Scunthorpe end of the route, the locomotive runs round the train at either Trent Junction or Trent Yard; these are effectively interchangeable in most cases. The upgrade to the signalling on the branch from Trent Junction to Dragonby is required to facilitate the

operation of these paths alongside the existing paths to/from Roxby Gullet. Providing that is delivered, there is no impact on these existing paths.

4.2 Performance Findings

A qualitative performance analysis was undertaken for each path by:

- Identifying any minimum margins with existing services;
- Using the Network Rail Performance Dashboard to identify the performance of these paths and therefore how likely there is to be an issue on a 'normal' day;
- Suggesting mitigations / workarounds as required.

In most cases, the interacting trains generally performed well enough that the chance of knock-on delays was minimal. Where larger interactions were identified, these could potentially be relieved by:

- Swapping the order of trains (e.g. running the freight train first when the interacting train is late);
- Dropping the freight path back to a fall-back path (e.g. if the York trains miss the available path on the East Coast Main Line).

Given these findings and the fact that only three trains per day in each direction are proposed to operate, the performance impact of the paths is likely to be negligible.

4.3 Future Proofing

The findings presented here are based on the latest current information available, the May 2020 timetable. On some of the routes the freight paths operate, it is known that there will be significant change in the relatively near future, for example a major rewrite of the East Coast Main Line timetable for 2022.

Although the detail of the timetable and the paths found will therefore change, it is likely that the fundamental principles will remain the same and therefore these findings will stand.

As an example, capacity in some hours for the freight paths on the East Coast Main Line is realised by the existing 'flighting' of trains. This occurs when a fast passenger train departs York towards Doncaster/London followed by a stopping train. This therefore requires a timetable 'gap' before the next fast train to avoid catching up the stopping train; the freight paths can use this timetable 'gap'. Although the timings of these trains will change with the timetable recast, the concept of this 'flighting' will not and therefore similar 'gaps' will exist

in the future. Therefore it can be concluded that there will likely be sufficient capacity to operate these paths even in the recast timetable.

4.4 Analytical Assurance

This work has been assured in two main ways:

- The use of the ATTUne software, which highlights non-compliance with the Timetable Planning Rules (TPR) automatically;
- Internal Quality Assurance checks undertaken within Ed Jeffery Limited.

4.5 Recommendations and next steps

This work has demonstrated that capacity to serve the development is available and these findings can therefore be used to support the DCO.

Further timetable development will likely be required at some point in the future to confirm the details of the paths on whichever future timetable applies at the time, either as a standalone exercise or as a part of the normal timetable planning process.

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