



Stations Conceptual Site Models

**The Chiltern Railways (Bicester to Oxford Improvements)
Order 2012**

Version 1

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Chiltern Railways

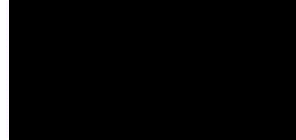
Stations Conceptual Site Models: *The Chiltern Railways (Bicester to Oxford Improvements) Order 2012*

February 2014

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Date: 17 February 2014

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1 INTRODUCTION

1.1 TERMS OF REFERENCE

The Chiltern Railway Company Ltd ('Chiltern Railways') and subsequently Network Rail have retained Environmental Resources Management Ltd ('ERM') to manage the discharge of planning conditions associated with improving the railway between Oxford and Bicester.

1.2 BACKGROUND TO THE SCHEME

In October 2012, the Secretary of State made the Chiltern Railways (Bicester to Oxford Improvements) Order 2012 ('the Order'). This Transport and Works Act Order authorises the construction and operation of an improved railway between Bicester and Oxford. The Order is accompanied by a planning direction (or 'deemed planning permission') granted by the Secretary of State, which is subject to a number of conditions.

The Order is being implemented by Chiltern Railways and Network Rail.

1.3 PLANNING CONDITIONS RELATING TO LAND QUALITY

In relation to land quality/contaminated land, Condition 11 set out in Annex 1 of the deemed planning permission requires that:

'No development shall commence...until a scheme to establish the presence or otherwise of, assess and, if necessary, remediate contamination at that location, which is likely to cause significant harm to persons, pollution of controlled waters or the environment within that section....'

It requires that a scheme of investigation be '...submitted to and approved in writing by the local planning authority, in consultation with the Environment Agency.'

The planning condition also notes that the scope of the scheme should include *'all of the potentially contaminated sites identified in Figures 15.1A to 15.1Q in Volume 3 of the Environmental Statement'* and specifically identifies the following areas of interest:

- Bicester Town, Islip, Water Eaton Parkway and Oxford station works; and
- sites of the proposed bridges, culverts or other below ground structures.

If the remediation of land contamination is required at any location, Condition 11 states that *'all remedial measures shall be undertaken before development at that location is commenced, unless agreed in writing with the local planning authority. Further, that a verification report is provided to demonstrate that*

the 'agreed remediation has been completed and that the necessary degree of decontamination has been achieved'.

In the event that previously unidentified contamination is encountered during development, *'no further construction shall be undertaken at that location, unless otherwise agreed in writing with the local planning authority, until a scheme to assess and remediate that contamination... has been submitted to and approved in writing by the local planning authority, in consultation with the Environment Agency'.*

1.4 SCOPE AND OBJECTIVES OF THIS REPORT

The structures, earthworks and stations along the route that are to be newly constructed or redeveloped were assessed to identify the potential for them to be impacted by current or historical contaminative land uses. This assessment was presented in the Scheme of Investigation⁽¹⁾ that was previously submitted in support of the partial discharge of Planning Condition 11.

This report discusses the redevelopments of Bicester, Islip and Water Eaton stations. The redevelopment of Oxford Station will be discussed in a separate report.

The locations of these stations along the route are presented in *Figure 1*. Bicester Chord, footbridges and overbridges, and earthworks along the route have been discussed in separate reports.

The objectives of this report are to:

- develop a desk-based preliminary conceptual site model for each of the stations along the route that have potential to be impacted by current and historical contaminant sources.
- determine the need, if any, for further intrusive investigation at each of the stations, based on an evaluation of the likely exposure and its potential significance to identified receptors.
- propose a scope of further works for each of the stations, where required.

1.5 REPORT STRUCTURE

Each Section of this report discusses a station and includes the following sub-sections:

- Site Location and Proposed Development
- Design of Structure

(1) ERM 'Scheme of Investigation for Land Contamination: The Chiltern Railways (Bicester to Oxford Improvements) Order 2012' for Chiltern Railways. Version 1, May 2013.

- Environmental Setting - including geology, hydrogeology and hydrology.
- Observed Impacts and Analytical Results
- Preliminary Conceptual Site Model - including quantitative risk assessment as appropriate.
- Conclusions and Recommendations

1.6

SOURCES OF INFORMATION AND ASSUMPTIONS

The sources of information that have been used in the production of this report are presented in *Table 1*.

Table 1 *Data Sources for the Desk Study Assessment of Potential Contaminant Sources, Potential Contaminant Receptors and Exposure Pathways*

Information	Data Source(s)
Site location and proposed development	Online aerial photography, OS mapping, published EA sources (landfill and pollution data), site visits, engineering AIP ⁽¹⁾ documents, communication with local authority contaminated land officer.
Design of structure	Engineering AIP documents
Site history	Historical OS maps from Envirocheck ⁽²⁾ , published EA sources (historical landfill data), communication with local authority contaminated land officer.
Geology	BGS 1:50,000 geological maps Sheet 219 'Buckingham' Solid & Drift ed., Sheet 236 'Witney' Solid and Drift ed. and Sheet 237 'Thame' Solid & Drift ed., BGS logs, Atkins ground investigation data.
Hydrogeology	Abstraction information obtained from EA under licence, published EA sources (groundwater topics), Atkins ground investigation data.
Hydrology	OS mapping, online aerial photography, published EA sources, RBM plans, site visits, abstraction information obtained from EA.
Designated ecological sites	English Nature website, communication with ERM ecologists.

(1) AIP - Atkins Approval In Principle Form F001 various documents dated December 2012

(2) - Envirocheck reports 27207959_1_1, 27207960_1_1 and 27207961_1_1 'Chiltern Railways Project Evergreen 3' 5 February 2009

A site visit was undertaken at Bicester and Islip Station and Water Eaton Station in the on 8 May 2013 in order to clarify the site setting in relation to potential sources of contamination. These visits were boundary visits only and did not include a detailed site walkover and no access was gained to the individual properties. However, information from these inspections has been included in the relevant sections of this report.

The study areas used for the sites are the same as those used in the Environmental Statement⁽¹⁾ and are listed in *Table 2*.

(1) Environmental Resources Management Ltd. 'The Chiltern Railways (Bicester to Oxford Improvements) Order Environmental Statement' ref. 0094441. December 2009.

Table 2

Study Areas Assessed in Desk Study Review

Information	Study Area
Potential historical and current sources of contamination	500 m buffer from the centre line from Bicester South Junction and A41, and from Peartree Park & Ride to Oxford station. 100 m buffer from the centre line in the rural section between the urban ends (from A41 to Peartree Park & Ride)
Human neighbours	500 m radius from feature.
Geological strata	Within the Limit of Deviation* of the site.
Aquifer designation and groundwater vulnerability	Within the Limit of Deviation of the site.
Groundwater source protection zones	1 km distance either side of the centre line.
Surface water courses	500 m distance either side of the centre line.
Licensed surface water abstractions	500 m distance either side of the centre line.
Designated ecological sites	500 m buffer from the centre line from Bicester South Junction and A41, and from Peartree Park & Ride to Oxford station. 100 m buffer from the centre line in the rural section between the urban ends (from A41 to Peartree Park & Ride)

*Limit of Deviation - the horizontal limits of where construction may occur

1 BICESTER STATION

1.1 SITE LOCATION AND PROPOSED DEVELOPMENT

Bicester Station platform is located between project chainage 110820m and 111040 m on the north side of the railway, approximately 50 m to the west of London Road level crossing in Bicester. The station is currently being served by a single bi-directional through line, with a siding running parallel and an adjacent second disused platform. It has been reported that the current platforms are in poor condition and to be settling and/or spreading. The station is due to be rebuilt to accommodate a twin track arrangement and two new single faced platforms on either side of the railway. The development area comprises the existing station buildings but also extends north to include land currently occupied by part of the McKay Trading Estate, Grayline Coach Station and MOT Test Centre, land which following development will form the access road, car parking and pick/up drop off points for the new station. South of the tracks, an area currently occupied by a grassed verge will be developed with a bus stop, further car and cycle parking and landscaping. The proposed layout is shown on *Figure 2*.

The new station area is located in a largely urban setting with the following neighbouring land uses:

- *North* – Warehousing and residential properties;
- *East* – Petrol Filling Station and tanks and residential properties.
- *West* – McKay Trading Estate & Bicester Village car parking
- *South-West* – Bicester Village Car parking
- *South* – Business Centre including office buildings

1.2 STATION DESIGN

The Approval In Principle report (AIP) for the Bicester Town Station⁽¹⁾ states that the proposed station will include a single storey station building (235 square metres) with ticket hall and cafe, twin tracks with two single sided platforms, and a foot bridge with staircase and lifts joining the two platforms. In addition, the development will comprise a new car park with associated infrastructure and landscaping. Ground disturbance activities associated with the proposed station development will be:

- Bored piled foundations (350mm diameter) are intended for the new station building due to poor ground conditions. It is understood that the new building will span across an existing culvert, however building design will take this into account so that the culvert is not subjected to any

(1) Atkins 'Chiltern Railways Company Ltd East-West Rail: Bicester Town Station Form F001: Approval in Principle' 5114534-ATK - ARC - FRM - 907002 - F001 Template v1.0.docx

adverse loading. The ground beneath the site will either be excavated and replaced or undergo ground improvement.

- The stations are primarily to be constructed at grade, but a significant length of embankment will be constructed at the Oxford end where the line crosses the Bicester Brook.
- Allowance has been made to provide 432m² of underground water attenuation storage via a geocellular crate storage system located under the main car park and an oil separator within the new car park located to the east of the new station building.
- The AIP report indicates that the western end of the emergency exit route from Platform 1 could be subject to flooding from the adjacent watercourse at project chainage 110862m. The average flood level has been calculated as 66.22metres Above Ordnance Datum (m AOD); with the toe of the existing rail embankment at 66.05m AOD. This will need to be considered during detailed design and finished levels of the emergency exit route raised above flood levels.

1.3 ENVIRONMENTAL SETTING

1.3.1 Site History

The railway has been in existence since before 1881 when the surrounding area was predominantly rural to the south and residential to the north. In addition to the current railway line, itself, a bus depot and coach station have been present on the current site from the 1968 until present, and the southern part of the McKay Trading Estate from the 1980s to present day, all a possible source of historical contamination. Sites with potential for historical contamination to be present in the surrounding area comprise:

- Brick works with kiln adjacent to the southeast, present from before 1881, labelled as disused from 1923;
- Gasholder and tanks adjacent to the northeast, present from before 1881 and last mapped in 1973, then replaced by residential housing in mid to late 1970's;
- Garage adjacent to the northern boundary, on the western side of the rail track, present before 1922 and last mapped in 1973;
- Bus depot to the east from 1968 to early 2000's (labelled as a garage from 1986);
- Engineering works to the north from before 1968, disused from 1973 and then redeveloped into part of the McKay Trading Estate from 1986;

- Filling station to the east from 1968 to present day;
- Electricity substation north of the site from 1972 to present day.

1.3.2

Geology

No drift geology is recorded within the footprint of the Bicester Town Station redevelopment. The bedrock geology is of Jurassic age, comprising the Kellaways Clay Member Mudstone which in turn is underlain by the Great Oolite Group up to 40m in thickness, the Cornbrash Member underlain by Forest Marble Member and then lower Great Oolite Group Members².

Atkins undertook a ground investigation for geotechnical purposes in the locality of the proposed development of Bicester Station in 2012 and 2013. The positions of the investigation locations and the logs, along with any BGS logs, are attached in *Annex A*. In relation to the proposed redevelopment at Bicester Town Station, WS43AAA, WS43B, BTWS01 and LRX WS01 were positioned at grade on site of the planned redevelopment. BTWS01 was located to the most southern extent of the redevelopment at approximate chainage 110905, whilst WS43AAA was located in close proximity of the existing railway approximately 60m further north. WS43B was located on the toe of the existing railway cutting located to the north-east of the proposed redevelopment at approximate chainage 110770, with LRX WS01 located at grade at the furthest north side of redevelopment as presented in *Figure 3*.

WS43AAA was located on the crest of the existing railway cutting which is approximately 0.5 m in height in this area. Made Ground was encountered at ground level to a depth of 0.60m below ground level (m bgl) and comprised 0.35m of silty gravelly sand containing ash underlain by 0.25m of fine to coarse sand. The underlying natural strata encountered consisted of firm to stiff orange brown mottled grey slightly sandy or gravelly clay containing some shell fragments. ERM interpreted this clay as indicative of the Kellaways Clay Member Mudstone.

Made Ground was encountered at ground level in WS43B to a depth of 0.2m bgl and comprised topsoil. This was underlain by Kellaways Clay Member Mudstone in the form of a 1.7 m thickness of soft mottled clay and soft slightly sandy clay with subrounded fine mudstone gravel.

Underlying the 0.45m of ballast at the location of LRX WS01 was a layer (0.2m thickness) of Made Ground comprising sandy clay. The underlying natural strata comprised a very thin layer (0.1m thickness) of sandstone cobbles further underlain by approximately 3m of firm sandy Clay with gravels of sandstone, mudstone and flint with some selenite crystals observed between 1.2m and 1.8m bgl.

² BGS log SP52SE161

Beneath the 0.2m of ballast at BT WS01, the underlying natural strata comprised very soft to firm sandy clay to a depth of 4.85m (Kellaways Clay Member Mudstone) further underlain by strong grey limestone indicative of the Cornbrash Member.

1.3.3 *Hydrogeology*

The Kellaways Clay Member Mudstone is designated as an Unproductive bedrock aquifer. The Ground Investigation Report from Atkins³ indicates that the Kellaways Clay is present to approximately 6m bgl which is underlain by the Cornbrash Member which varies in thickness from 1m to 4m. The borehole log from BTWS01 indicates that the Cornbrash is present at 4.9m bgl. This is further underlain by the Forest Marble Member, from approximately 10m bgl. These are all designated as Secondary A aquifers.

The site is not located within a groundwater vulnerability zone or a groundwater source protection zone and there are no licensed groundwater abstractions within 1 km of the site.

Groundwater was encountered in WS43B at depths of approximately 0.6 m and 0.9m bgl, assumed to be perched rather than indicative of an aquifer (e.g. perched water resting at the base of the Made Ground).

Dampness was recorded during drilling in the Kellaways Clay Member Mudstone in LRX WS01 at a depth of approximately 2.0m bgl.

1.3.4 *Hydrology*

The nearest named surface water course is Langford Brook which runs from the north-east in a southward direction approximately 340 m to the west of the current Bicester town station. The Environment Agency (EA) has assessed its current ecological status in the vicinity of the site to be 'Moderate' and predicts that it will have reached 'Good' by 2015, although the EA evaluates that there is a risk that this may not be achieved. It does not consider that chemical quality requires assessment.

There are no currently licensed surface water abstractions within 1 km of the site.

1.3.5 *Hydrogeological Model*

Shallow groundwater was encountered in WS43B at depths of less than 1.0m bgl. However, this was not consistent and likely indicative of perched groundwater rather than an aquifer. There is insufficient data to infer a groundwater flow direction, and given the underlying low permeability

³ Atkins 'Chiltern Railways Company Ltd East-West Rail: Ground Investigation Report: Jarvis Lane to M40 Overbridge August 2013' 5114534-ATK - GEO - RPT - 010011 P01

geology and the absence of superficial drift deposits in the area, no continuous body of shallow groundwater is considered likely.

Deeper groundwater, assuming it is in continuity with the baseflow of the river would be expected to flow towards the Langford Brook, in a generally south/south-west direction.

1.3.6 Ecological Sites

There are no designated ecological sites within 500 m of the site.

1.4 OBSERVED IMPACT AND ANALYTICAL RESULTS

No visual or olfactory evidence of impact was noted on the available logs with the exception of some ash in the top 0.35 m of Made Ground on the toe of the existing railway cutting.

There are currently no analytical results for the boreholes located in the vicinity of Bicester Station. ERM understand that a Site Investigation of the Bicester Town Station Site is due to be undertaken in early 2014. The results of the laboratory analysis will be assessed against the materials Reuse Criteria and should elevated concentrations or visual contamination be encountered this will be addressed in accordance with the Method Statement for Managing Previously Unidentified Contamination⁴.

1.5 PRELIMINARY CONCEPTUAL SITE MODEL

1.5.1 Introduction

The preliminary conceptual site model (CSM) has been developed in accordance with industry good practice. It uses the information and data presented in Sections 2.1, 2.2, 2.3 and 2.4 to identify plausible contaminant-pathway-receptor contaminant linkages in the context of the proposed redevelopment works. The findings of the CSM are used to determine the potential risks associated with land quality in the context of likelihood of unacceptable exposure of sensitive receptors.

1.5.2 Potential Primary Sources of Contamination

On-Site

Potential on-site sources of contamination in addition to the railway sidings and track itself would include the coach station (present since 1968), the MOT test centre and commercial units based on the southern section of the McKay

⁴ ERM, August 2013. 'Method Statement for Managing Previously Unidentified Contamination V2'

Trading Estate. Fluid leaks and refuelling spillages may have occurred on the site as a result of the long term use as a bus/coach station.

Off-Site

The railway track ballast has potential to be contaminated and ash was observed in the Made Ground during the drilling of borehole WS43AAA. There is potential for the track bed to be impacted historically by creosotes seeping from wooden sleepers, and from oils, greases and diesel fuel which could leak/drip from passing trains.

Other contaminants that may have impacted the ballast include: weedkillers such as atrazine, simazine, diuron and glyphosate which may have been used in track maintenance; antifreezes such as ethylene glycol; and pathogens associated with disposal of sanitary waste from passing trains. However, herbicides, ethylene glycol and sanitary waste contaminants are considered unlikely to be present at significant concentrations because they are not persistent in the environment.

The area formerly occupied by a gasworks with gas holder and tanks to the northeast, although redeveloped into residential housing in mid to late 1970's, has the potential to be contaminated with oils, tars and phenols.

Possible waste oil and fuel oil storage at the MOT test centre, former engineering works, historical bus depots and garages.

Fluid leaks and refuelling spillages from the petrol filling station present since 1968 and potential for polychlorinated biphenyls (PCBs) in relation to the electricity substation.

1.5.3 *Potential Receptors*

The following potential receptors of soil and/or groundwater impact were identified:

- Future users of the site although it is anticipated that the majority of the site will be covered by hardstanding which is likely to limit exposure of future site staff to contamination in the soil or groundwater;
- Local employees in adjacent offices, the trading estate and commercial properties;
- Local residents 50m to the east and 100m to the north;
- Langford Brook located 340m to the west; and
- Cornbrash Member and Forest Marble Member of the Greater Oolite Group Secondary A Aquifers.

Groundworkers are discounted from this assessment because they will be protected through health and safety systems and controls during the works. It is anticipated that procedures for worker protection will be covered by method statements which will be produced by the contractor.

Below ground structures are discounted from this assessment because the engineers (Atkins) are independently evaluating soil and groundwater chemical data in order to finalise detailed design requirements and to ensure that suitably chemically-resistant construction materials are used.

1.5.4 *Evaluation of Potential Contaminant Linkages*

Table 3 provides an evaluation of the potential contaminant linkages to determine which are considered to be plausible.

1.6 *CONCLUSIONS AND RECOMMENDATIONS*

The Code of Construction Practice (CoCP) ⁽⁵⁾ provides mitigation measures that remove the pathways from all of the identified potential contaminant linkages. However, during further ground investigation and site works, it is possible that contamination may be encountered which could trigger linkages associated with the potential to mobilise on- and off-site contaminants during the redevelopment works proposed for Bicester Town Station. The ultimate receptors for this mobilisation could be the Langford Brook and the near-surface Secondary A Aquifers (Cornbrash Member and Forest Marble Member of the Greater Oolite Group).

A Ground Investigation is due to be undertaken at the Bicester Town Station in early 2014. It is proposed to reuse any material under the scheme in accordance with the Materials Management Plan and Reuse Criteria. Any contamination identified at the Site will be assessed in relation to these documents and any exceedances will be dealt with in accordance with the Method Statement for Managing Previously Unidentified Contamination. A Validation report will be prepared following completion of the Scheme which will detail whether any unidentified contamination was encountered and how it was dealt with.

It is recommended that this information is provided to the construction contractor to ensure that an awareness for potential contamination to be present is communicated to all employees and sub-contractors working at the site.

⁽⁵⁾Environmental Resources Management Ltd. 'Chiltern Railways (Bicester to Oxford Improvements) Order Code of Construction Practice' v.6. ref. TWA/10/APP/01/Oxford/ALL/C18/CoCP. September 2013.

2.1 SITE LOCATION AND PROPOSED DEVELOPMENT

Islip Station and associated redevelopment is located at project chainage 120500 m approximately 200m north of Islip village and immediately south of the M40 (*Figure 1*). The site is currently part cutting, part embankment and part at grade and carries the current single track railway line between Oxford and Bicester, with a single track and existing station building. The station development is due to be expanded to accommodate a twin track arrangement and second platform, new footbridge and expanded car parking. The proposed layout of the station is presented in *Figure 4*.

The station is in a mixed rural and residential setting with the following neighbouring land uses:

- *North West* –Former Railway Sidings and Islip Oil Depot (disused)
- *North* - Agricultural land and residential properties
- *East* – Agricultural land
- *South* –Manor Farm and Residential properties
- *South West* – residential properties

2.2 STATION DESIGN

No new station building is being constructed at Islip, however the new station development will include the following:

- Two new 3.2m wide platforms constructed on either side of the railway at Islip. The usable length of each platform is to be approximately 194m to accommodate 8-car-long trains with stopping tolerance. Fencing protection is to be provided at the back of the new platforms as well as at the front and sides of access passages.
- The new platforms will lie partly in cutting, partly at grade and partly on embankment. The new platforms will be a combination of ‘Crosswall and plank’ on embankment and ‘Traditional front wall’ in cutting, depending on ground conditions and topography. The crosswall and plank type will be adapted for use on piled foundations. The use of piled foundations allows for the extent of the platforms to impinge on the existing embankment and made ground.
- A new single span steel footbridge with staircases will be provided around the midpoint of the platform length.

- The station car park will be revised to provide 26 standard car parking spaces, 2 disabled spaces, 2 motorbike spaces and covered parking for 10 pedal cycles; and a new drainage system will be installed to collect surface water with surface water attenuation provided below the car park. The drainage system will comprise carrier drains with a combination of road gullies and drainage ditches.

2.3 ENVIRONMENTAL SETTING

2.3.1 *Site History*

The railway has been in existence since before 1876 in a similar semi-rural/residential setting as today, located approximately 200m north of Islip village. In addition to the current railway line, itself a possible source of historical contamination, other sites with potential for historical contamination to be present nearby were:

- Islip Oil Depot – approximately 300m north, present on the maps between the 1920s and 1940s. Known to be present to the current day, although recently disused (and does not appear on the historical maps from the 1980s onwards);
- A small goods yard was present to the north of the station from the end of the 19th Century until the 1970s; and
- Former railway sidings.

2.3.2 *Geology*

Published geology indicates the Site, in places, is underlain by superficial deposits of River Terrace Gravels (thin to absent up to 2m at eastern end) underlain by bedrock geology of Jurassic age, a faulted area of Peterborough Member of Oxford Clay Formation (possibly around 10 m thick), further underlain by Kellaways Formation - Sands Member (2-5 m thick).

Atkins undertook a Ground Investigation for geotechnical purposes¹ in the locality of the Station site (BH198 was located in the station car park and boreholes BH199 and BH200 were located in the verge adjacent to the station access road) Further afield there are also eight other Borehole Logs in the vicinity of the Station, TB77, TB78, WS159, WS160, WS161, WS162, WS163 and WS164². The position of the investigation locations are presented on *Figure 5* and the Borehole Logs are attached in *Annex A*.

¹ Atkins 'Chiltern Railways Company Ltd East-West Rail Phase 1: *Ground Investigation Report: Islip Cutting*' 5114534-ATK - GEO - RPT - 010013 - P01 August 2013

² CCGI 'Chiltern Railways Company Ltd East-West rail Phase 1: *Trackbed Factual Report*' Report Number C3723 November 2013

The Borehole Logs indicate that firm to stiff fissured sandy/silty Clay was encountered beneath the Made Ground of gravelly sand with a thickness of up to 13.6m (indicative of Oxford Clay) underlain by bands of Limestone and Siltstone proven to a thickness of >12m (indicative of the Kellaways Formation).

2.3.3 *Hydrogeology*

The River Terrace Gravels (where present) are designated as a Secondary A Aquifer underlain by Unproductive Strata (Oxford Clay) and further underlain by the Kellaways Sand Member, designated as a Secondary A Bedrock Aquifer.

The site is not located within a groundwater vulnerability zone or a groundwater source protection zone and there are no currently licensed groundwater abstractions within 1 km of the site.

Groundwater was encountered in BH198 during drilling although the well was not installed so resting water level data is not available. Water strikes ranged between 1.2m and 3.6m bgl in the borehole logs.

2.3.4 *Hydrology*

The nearest surface water feature to the proposed station is Bletchingdon Brook, a tributary of the River Ray flowing in a southerly direction 200m east of the site.

The River Ray (Oxon Ray) is located 360m to the south flowing east to west.

The current chemical status of both the Bletchingdon Brook and River Ray at their nearest points are Class C (Fairly Good) as classified by the Environment Agency.

There are no currently licensed surface water abstractions within 1 km of the site.

2.3.5 *Hydrogeological Model*

Groundwater was encountered during the Ground Investigation undertaken by Atkins in 2013 at depths between 1.2m and 3.6m bgl.

Data from the borehole logs and BGS records infer a regional groundwater flow towards the south. However, this should be regarded with caution as the faulting in the area (to the north), the railway cutting and there is the potential for artesian conditions to be present.

However, a southerly groundwater flow direction would indicate that any contaminants that might be released from Islip Oil Storage Depot may migrate towards the site of the Islip Station. There is, therefore, potential for soil and

groundwater impacted by off-site sources to be encountered during redevelopment.

2.3.6 *Ecological Sites*

No ecological sites have been recorded within 1km of the site.

2.4 *OBSERVED IMPACT AND ANALYTICAL RESULTS*

The ballast in WS159-WS164 (nearby to the station site) was noted to be 'dirty' on the borehole log. The Atkins report states that Made ground was noted in BH198 at 1m bgl which comprised slag, ash and coal. No other visual or olfactory evidence of contamination was noted on the borehole logs.

The analytical results are presented in Annex B with the relevant samples for the boreholes in the vicinity of Islip Station. The following analytical data has been reviewed:

- soil analytical data for WS163 and WS164,
- soil leachate data for WS163; and
- groundwater data for WS162 and WS163.

The soil analytical results indicate low level detections of metals (WS163 and WS164), TPH and PAHs in the shallow soils (<1m), however none of the results exceeded the materials re-use screening criteria³.

Zinc was found to be slightly elevated within groundwater at WS163 (screened within the Clay) when compared against the Surface Water EQS' and Sulphate also exceeded the screening criteria in WS162. Aromatic hydrocarbons (C16-C35) were also detected in WS162 but were below the screening criteria where they are available.

However, based on the State of the Aquifer Report⁴, which relates to the nearby Greater Oolite Limestone Members and Forest Members (but Jurassic geology), sulphate can occur naturally up to 180 mg/l. Furthermore, in areas when the limestone aquifer becomes more confined, the natural levels of sulphate ions increase in the water.

WS162 is located at track level to the north of the railway track, assumed down gradient of the former oil depot and former railway sidings. It is not conclusive whether the detected concentrations of sulphate and aromatic hydrocarbons in the groundwater are from one specific source or a combination of sources.

³ Environmental Resources Management Ltd. 'Chiltern Railways (Bicester to Oxford Improvements) Order Code 2012' Soil Re-use Criteria Report V1. November 2013

⁴ Jurassic Limestone (Bristol Avon), Groundwater Monitoring Unit, Environment Agency, (April 2005)

Asbestos (in the form of chrysotile) was identified in the Made Ground sample taken from 0.5 m deep in WS164 which was located to the north of the railway track northeast of Roadbridge OXD42. This location is adjacent to the residential properties.

Carbon dioxide and Carbon monoxide are noted in the Gas Monitoring results from WS160, WS162 and WS163. A maximum concentration of Carbon Dioxide was noted in WS163 in May 2013 (Round 4) of 6.4% and a maximum concentration of Carbon Monoxide of 2.0ppm in April 2013 (Round 2).

2.5 PRELIMINARY CONCEPTUAL SITE MODEL

2.5.1 Introduction

The preliminary conceptual site model (CSM) has been developed in accordance with industry good practice. It uses the information and data presented in *Sections 3.1, 3.2, 3.3 and 3.4* to identify plausible contaminant-pathway-receptor contaminant linkages in the context of the proposed station redevelopment. The findings of the CSM are used to determine the potential risks associated with land quality in the context of likelihood of unacceptable exposure of sensitive receptors.

2.5.2 Potential Primary Sources of Contamination

On-Site

The potential on-site sources of contamination are associated with the railway sidings and track. There is potential for the track bed to be impacted historically by creosotes seeping from wooden sleepers, and from oils, greases and diesel fuel which could leak/drip from passing trains.

Other contaminants that may have impacted the ballast include: weedkillers such as atrazine, simazine, diuron and glyphosate which may have been used in track maintenance; antifreezes such as ethylene glycol; and pathogens associated with disposal of sanitary waste from passing trains. However, herbicides, ethylene glycol and sanitary waste contaminants are considered unlikely to be present at significant concentrations because they are not persistent in the environment.

Off-Site

The oil storage depot (MOD site) with associated tanks is located approximately 300m to the north. In addition, an Oil and Pipelines Agency fuel pipeline runs along Bletchingdon Road approximately 200m to the west of the site. Given the potential groundwater flow direction it is anticipated that any potential contamination associated with the oil storage depot would flow towards the Site.

2.5.3 *Potential Receptors*

The following potential receptors of soil and/or groundwater impact were identified:

- River Terrace Gravels Secondary A Drift Aquifer (where present);
- Kellaways Formation Secondary A Bedrock Aquifer;
- Bletchington Brook flowing south 200m east of the site and the River Ray 360m to the south flowing east to west;
- Local residents 50m west and east, 130m south-west and 160m to the north-east;
- Site Users; and
- Local employees.

Groundworkers are discounted from this assessment because they will be protected through health and safety systems and controls during the works. It is anticipated that procedures for worker protection will be covered by method statements which will be produced by the contractor.

Other human receptors are discounted from this assessment, as there are no full time staff present at Islip and because it is considered that the ground surrounding the redevelopment would only be accessed infrequently, or for short regular durations by members of the public and therefore, significant exposure is considered unlikely.

Below ground structures are discounted from this assessment because the engineers (Atkins) are independently evaluating soil and groundwater chemical data in order to finalise detailed design requirements and to ensure that suitably chemically-resistant construction materials are used.

2.5.4 *Evaluation of Potential Contaminant Linkages*

Table 4 provides an evaluation of the potential contaminant linkages to determine which are considered to be plausible.

2.6 **CONCLUSIONS AND RECOMMENDATIONS FOR ISLIP STATION REDEVELOPMENT**

The CoCP⁵ provides mitigation measures that remove the pathways from all of the identified potential contaminant linkages.

5 Environmental Resources Management Ltd. 'Chiltern Railways (Bicester to Oxford Improvements) Order Code of Construction Practice' v.6. ref. TWA/10/APP/01/Oxford/ALL/C18/CoCP. September 2013.

There is the potential for contamination to be present from offsite sources to the north of the Site. ERM understands that the excavation work for the platforms and footbridge will be undertaken in close proximity to this offsite area and may include piling works where shallow contamination could be identified. Any identified contamination, if encountered will be addressed in accordance with the Method Statement for Managing Previously Unidentified Contamination⁶ and assessed in accordance with the materials re-use criteria.

The gas monitoring results indicate very low detection of carbon monoxide (up to 2ppm) and moderate detection of carbon dioxide (up to 6.4%), however flow rates are generally low. When compared against existing guidance these concentrations and flow rates do not indicate that protective measures are required. In addition, carbon dioxide is denser than air and would tend to settle in low areas or be dispersed by wind. Carbon monoxide is close to the density of air, and would tend to diffuse into the air above ground. The only confined spaces that are present onsite will be the proposed lift systems. Given that the lift doors will open on a regular basis and therefore replenish the air quality frequently, ERM do not consider there to be a risk onsite from soil gas for the proposed new development.

No contamination sources have been identified in the vicinity of the station car park and proposed drainage works, and therefore the proposed works are considered unlikely to significantly increase the mobilisation of any contaminants. During excavation, any contamination that may be encountered will be dealt with as per the methodology in the Method Statement for Managing Previously Unidentified Contamination⁷.

Asbestos is noted in one of the samples analysed from WS164. It is recommended that this information, and the information in this report, is provided to the construction contractor to ensure that an awareness for potential contamination to be present is communicated to all employees and sub-contractors working at the site.

⁶ ERM, August 2013. 'Method Statement for Managing Previously Unidentified Contamination V2'

3 WATER EATON STATION

3.1 SITE LOCATION AND PROPOSED DEVELOPMENT

The Water Eaton Station development is located at project chainage 124000 m approximately 1km south of Kidlington and 4km north of Oxford (*Figure 1*). The site is currently occupied by railway sidings and comprises part of the Water Eaton Park and Ride Site and carries the current single track railway line between Oxford and Bicester. The grain silo that was present onsite has now been demolished. The site is due to be completely redeveloped to accommodate a train station, platforms, additional parking and associated infrastructure. This Site is located in a predominantly rural setting surrounded by agricultural land and roadways.

The proposed Station is surrounded by the following neighbouring land uses:

- *North* – A34 beyond which is agricultural land
- *East* – Water Eaton Park & Ride
- *South* – Golf course and agricultural land
- *West* – Agricultural land and Stratfield Brake Sports Grounds

The nearest residential property is a farmhouse located 420m to the south of the site.

3.2 STATION DESIGN

The AIP report sets out the specification of the new station and platforms including the construction of the drainage system. *Figure 6* reproduces the outline designs provided in that report. Ground disturbance activities associated with the proposed station development are as follows:

- Construction of a new station building and associated foundations and drainage.
- Creation of two new 5.2m wide single faced platforms to be constructed either side of the railway. Platform 1 for Oxford bound trains and Platform 2 for Bicester and London Bound trains. The useable length of each platform is to be approximately 218m, although there is a provision allowed in the design to extend the platforms to accommodate longer trains.
- A single span bridge with staircases and lifts will be built at the Oxford end of the platform.

- Construction of drainage channel and gullies at 15m intervals along the platform which will discharge to an existing ditch via cast iron downpipes. The ditch will be realigned to suit the position of the new platform.
- A new filter drain at the western end of the platform.

3.3 ENVIRONMENTAL SETTING

3.3.1 Site History

The railway has been in existence since before 1876 in a similar rural setting as today. Prior to 1936 a small degree of development occurred consisting of additional road embankment for the A423 Oxford Road (now A4165) and the construction of Water Eaton Bridge.

According to the internet¹, the Water Eaton grain silo was constructed at the start of the Second World War to help feed the nation. It comprised a seven story building, and grain was mechanically taken to the top and cascaded down through a series of driers. The site remained in use until late 1980s when it was closed, and it is reported that the site was used by several business after this time including a pet food supplier and a car breaker. The grain silo has now been demolished.

By 1971 the grain silo infrastructure which included an electricity substation was indicated on the historical maps. Between 1999 and 2008 the development of the Water Eaton Park & Ride took place on-site and immediately adjacent to the eastern site boundary with the addition of settlement ponds. At the same time, small infrastructure development occurred on-site.

From a review of historical maps the following potential onsite sources of contamination have been identified: the former and existing railway and rail sidings, grain silo and associated infrastructure (e.g. electrical substation, tanks) and miscellaneous subsequent uses of the grain silo site (e.g. car breakers).

In addition to the current railway line, itself a possible source of historical contamination, sites with potential for historical contamination to be present in the surrounding area comprise:

- Golf course to the south, present from before 1914 and expanded prior to 1955 to lie adjacent to the Oxford Road on the southern site boundary;

¹
http://www.oxfordmail.co.uk/news/community/memorylane/10751298.a_look_back_at_the_history_of_the_Water_Eaton_grain_silo_as_wartime_facility_nears_its_end/

- Major construction work associated with the A34 occurred immediately adjacent to the north and west boundaries of the site between 1982 and 1991;
- Large scale residential development occurred approximately 500m to the north-west of the site forming 'Gosford' between 1936 and 1971, originally with a large garage with later redevelopment into a superstore in its current layout;
- Historic landfill (last waste received in 1973), deposited Waste included Inert, Industrial, Commercial and Household Waste registered as Pear Tree Railway Cutting located approximately 500m south-west.

3.3.2

Geology

The published geological maps indicate that there are no drift deposits underlying the footprint of the proposed Water Eaton Station development. The bedrock geology is of Jurassic age, comprising the Peterborough Member of the Oxford Clay Formation (noted to be in excess of 10m thick), which is further underlain by the Kellaways Formation - Sands Member.

A series of Ground Investigations have been undertaken in the vicinity of the proposed station. These are referenced below:

- Atkins '*Chiltern Railways Company Ltd East-West Rail Phase 1: Ground Investigation Report*' - 5114534-ATK-EWRP1-GE-002
- Atkins '*Chiltern Railways Company Ltd East-West Rail Phase 1: Ground Investigation Report*' 5114534-ATK - GEO - RPT - 010014 - P01 August 2013
- CCGI '*Chiltern Railways Company Ltd East-West Rail Phase 1: Trackbed Factual Report*' Report Number C3723 November 2013

The positions of the investigation locations and the logs, along with any BGS logs, are attached in *Annex A* and presented on *Figure 7*.

The Atkins exploratory hole locations generally confirmed the published geology, with Made Ground comprising gravelly sand or ballast extending to c.0.5m depth underlain by firm to stiff fissured slightly sandy silty clay with occasional gravels and shell fragments. ERM has correlated this with four BGS recorded borehole logs in the immediate vicinity where Oxford Clay (up to 20m thick) was identified. ERM has interpreted the silty clay to be Peterborough Member of the Oxford Clay Formation.

3.3.3 *Hydrogeology*

The Peterborough Member of Oxford Clay Formation (>10m) is designated as unproductive strata which is underlain (probably at <15m depth) by the Kellaways Sand Member, designated as a Secondary A bedrock aquifer.

The site is not located within a groundwater vulnerability zone or a groundwater source protection zone and there are no currently licensed groundwater abstractions within 1 km of the site.

Perched groundwater was encountered in the shallow Made Ground only in ONP WS02 during drilling. No groundwater was encountered during drilling that could be indicative of representing an aquifer.

3.3.4 *Hydrology*

The nearest surface water courses are the River Cherwell located >1km to the east of the site and the Oxford Canal approximately 1km to the west of the site, both flowing southwards towards the River Thames. The current ecological and chemical status of the River Cherwell and the Oxford Canal has been assessed as 'Very Good' and 'Moderate' respectively by the EA.

An unnamed drain crosses through the south of the site and two ponds are located adjacent to the proposed development area, east of the Water Eaton Park and Ride.

There are no currently licensed surface water abstractions within 1 km of the site.

3.3.5 *Hydrogeological Model*

Groundwater was not encountered during the ground investigation undertaken by Atkins in 2012/2013 other than some perched water. However, groundwater was encountered at 4.6metres below ground level (m bgl) in the unweathered Oxford Clay ⁽²⁾ in a trial pit excavated during road improvements in 1986.

There is insufficient data from Atkins or BGS records with which to infer a regional groundwater flow direction, but based on the topography and location of the drains, River Cherwell and Oxford Canal, it is inferred that regional groundwater flow direction could be towards the south/south-east. As shallow groundwater in the vicinity of the site is ephemeral or absent, there is little potential for soil and groundwater impacted by off-site sources to be encountered during development.

(2) BGS Log SP51SW83

3.3.6 Ecological Sites

A medium meta-population of great crested newts (GCN) are supported in two ponds located adjacent to the site.

3.4 OBSERVED IMPACT AND ANALYTICAL RESULTS

The ballast encountered during the drilling of ONP WS01 was observed to be 'grey' and 'dirty' on the available log. A strong creosote odour was noted in T41 at 0.2m bgl, which is anticipated to be associated with the railway sleepers that were also noted at this depth and a maximum PID reading of 23.9ppm. Ash and coal was also noted in the shallow Made Ground in T42. Low level PID readings were also noted in T41, T42, T43 and T44 with a maximum reading of 23.9ppm in T41 at 0.3m bgl.

A strong bituminous odour was noted within the Unweathered Oxford Clay (between 2.80m and 3.40m bgl) from BGS Trial Pit No. 119 ⁽³⁾. No other visual or olfactory evidence of impact was noted in the available borehole logs.

The soil and groundwater analytical results are presented in *Annex B*.

Three samples were taken for laboratory analysis during the Trackbed Investigation. These were from

- TB032 (0.0-0.2m bgl and 0.5m bgl) and
- TB034 (0.0m - 0.5m bgl).

Analytical results from the Trackbed Investigation presented detections of lead and arsenic in all three samples, however these were below the screening criteria (Materials Reuse Criteria). Aliphatic hydrocarbons (>C16-C35) were also detected in TB032 (0.0-0.2m bgl) at a concentration of 56 mg/kg and TB034 (0.0-0.5m bgl) at a concentration of 93 mg/kg. These detections were also below the screening criteria.

An additional investigation was undertaken by Atkins at the Water Eaton Station. Presently ERM only have the laboratory analysis for this investigation.

The soil results indicate exceedances in the shallow soils in two locations,

- T44 (0.6m bgl); and
- T41 (0.3m bgl).

Four exceedances of polyaromatic hydrocarbons⁴ were noted in T44 at 0.6m bgl, however these were only marginally (same order of magnitude) above the

³ BGS Borehole Log SP51SW83

⁴ benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene and Ideno (1,2,3-cd) pyrene

relevant screening criteria. A second sample was taken from T41 at 1.0m bgl and no exceedances of the screening criteria were recorded.

There was one noted exceedance in T41 of naphthalene at 0.3m bgl which recorded a concentration of 17.6mg/kg above the screening concentration of 3.6mg/kg, however a sample taken at 0.7m bgl showed no exceedances of screening criteria.

There were no other exceedances noted in the soil or groundwater results.

3.5 *PRELIMINARY CONCEPTUAL SITE MODEL*

3.5.1 *Introduction*

The preliminary conceptual site model (CSM) has been developed in accordance with industry good practice. It uses the information and data presented in this report to identify plausible contaminant-pathway-receptor contaminant linkages in the context of the proposed redevelopment. The findings of the CSM are used to determine the potential risks associated with land quality in the context of likelihood of unacceptable exposure of sensitive receptors. The CSM is summarised in *Table 5*.

3.5.2 *Potential Primary Sources of Contamination*

On-Site

- Aggregate sidings;
- Former Grain Depot with ancillary infrastructure (e.g. tanks etc);
- Electrical sub-station;
- Railway storage; and
- Car Breakers Yard.

Off-Site

There is potential for the track bed to be impacted historically by creosotes seeping from wooden sleepers, and from oils, greases and diesel fuel which could leak/drip from passing trains.

Other contaminants that may have impacted the ballast include: weedkillers such as atrazine, simazine, diuron and glyphosate which may have been used in track maintenance; antifreezes such as ethylene glycol; and pathogens associated with disposal of sanitary waste from passing trains. However, herbicides, ethylene glycol and sanitary waste contaminants are considered unlikely to be present at significant concentrations because they are not persistent in the environment. Soil samples taken in the area indicate that there are areas of localised contamination in the shallow soils.

An historic landfill is present to the south-west of the proposed station redevelopment works which has reportedly accepted inert, industrial,

commercial and household waste. Further details of the site use and history are not available so there is considered to be a potential for the release of leachate to the surrounding area. However, given its proximity to the site (approximately 500m distance), significant impact is considered to be unlikely.

Sources Discounted from Further Assessment

Landfill gases could be released from the landfill. However, as the landfill is located 500m south-west of the development works within a rural area. Given the presence of low permeability Oxford Clay in the area, significant migration of gases towards the development area is not considered likely.

3.5.3 *Potential Receptors*

The following potential receptors of soil and/or groundwater impact were identified:

- Ponds containing great crested newts (adjacent to the eastern site boundary);
- Kellaways Sand Member Secondary A aquifer; and
- Station and Water Eaton Park and Ride users adjacent to the site and local residents 420m to the south.

Groundworkers are discounted from this assessment because they will be protected through health and safety systems and controls during the works. It is anticipated that procedures for worker protection will be covered by method statements which will be produced by the contractor.

Other human receptors are discounted from this assessment because it is considered that the ground surrounding the earthworks would only be accessed infrequently, or for short regular durations by members of the public and therefore, significant exposure is considered unlikely.

Below ground structures are discounted from this assessment because the engineers (Atkins) are independently evaluating soil and groundwater chemical data in order to finalise detailed design requirements and to ensure that suitably chemically-resistant construction materials are used.

3.5.4 *Evaluation of Potential Contaminant Linkages*

Table 5 provides an evaluation of the potential contaminant linkages to determine which are considered to be plausible.

Whilst some localised potential sources of contamination could exist at the site from the historical site uses, based on the current information no significant pollutant linkages are anticipated to be present following redevelopment of the site. The CoCP⁵ provides mitigation measures that remove the pathways for deposition of dust/soil particles to air and water from the identified potential contaminant linkages.

As groundwater was not encountered, the potential contaminant linkages associated with the potential to mobilise on- and off-site contaminants during the proposed development are not considered to be plausible.

The analytical results indicate localised areas of minor contamination, likely to be associated with the Made Ground. ERM consider it unlikely that these localised areas will cause significant risk to health or the environment and given the proposed hard standing at the site do not warrant remediation. However during excavation, should any additional contamination be encountered, it will be dealt with in accordance with the Method Statement for Managing Previously Unidentified Contamination⁶.

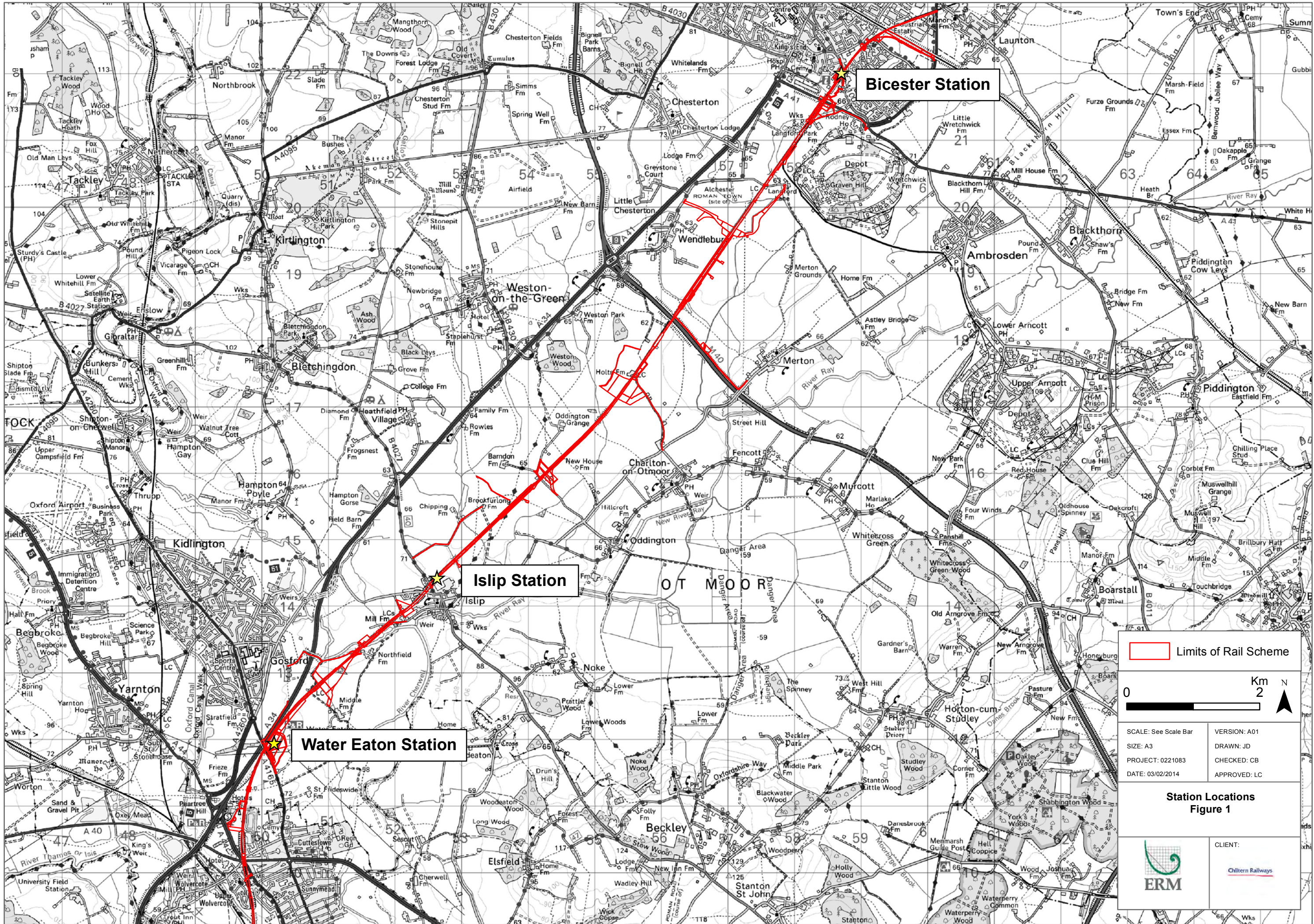
It is recommended that this information is provided to the construction contractor to ensure that an awareness for potential contamination to be present is communicated to all employees and sub-contractors working at the site.

⁵ Environmental Resources Management Ltd. 'Chiltern Railways (Bicester to Oxford Improvements) Order Code of Construction Practice' v.6. ref. TWA/10/APP/01/Oxford/ALL/C18/CoCP. September 2013.

⁶ ERM, August 2013. 'Method Statement for Managing Previously Unidentified Contamination V2'

Figures

<i>Figure 1</i>	<i>Stations Location Plan</i>
<i>Figure 2</i>	<i>Bicester Station Proposed Layout</i>
<i>Figure 3</i>	<i>Bicester Station Borehole Location Plan</i>
<i>Figure 4</i>	<i>Islip Station Proposed Layout</i>
<i>Figure 5</i>	<i>Islip Station Borehole Location Plan</i>
<i>Figure 6</i>	<i>Water Eaton Station Proposed Layout</i>
<i>Figure 7</i>	<i>Water Eaton Station Borehole Location Plan</i>



Bicester Station

Islip Station

Water Eaton Station

Limits of Rail Scheme

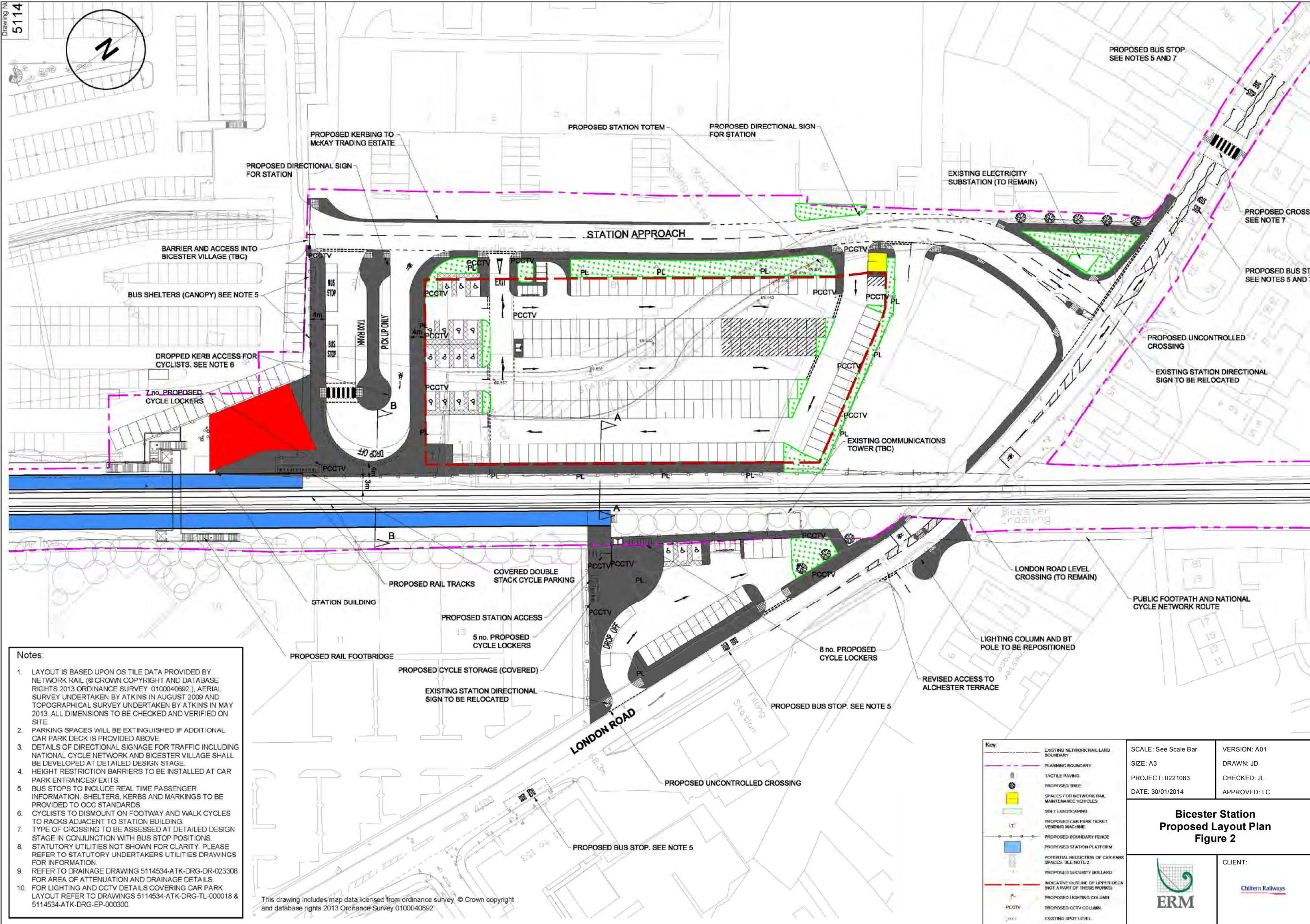


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 VERSION: A01
 SIZE: A3
 PROJECT: 0221083
 DATE: 03/02/2014
 DRAWN: JD
 CHECKED: CB
 APPROVED: LC

**Station Locations
 Figure 1**



CLIENT:
 Chiltern Railways



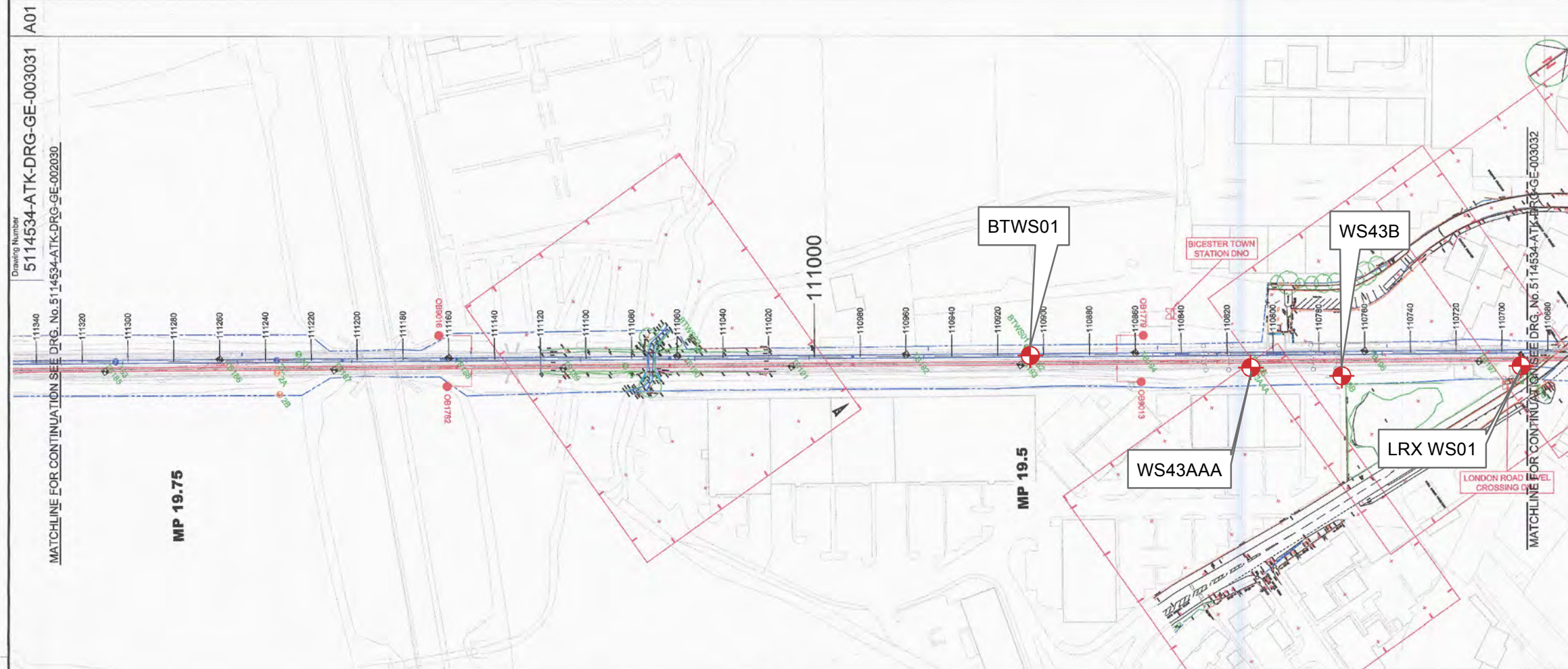
- Notes:**
- LAYOUT IS BASED UPON OS TILE DATA PROVIDED BY NETWORK RAIL (© CROWN COPYRIGHT AND DATABASE RIGHTS 2013 ORDINANCE SURVEY 0100040692.), AERIAL SURVEY UNDERTAKEN BY ATKINS IN AUGUST 2009 AND TOPOGRAPHICAL SURVEY UNDERTAKEN BY ATKINS IN MAY 2013. ALL DIMENSIONS TO BE CHECKED AND VERIFIED ON SITE.
 - PARKING SPACES WILL BE EXTINGUISHED IF ADDITIONAL CAR PARK DECK IS PROVIDED ABOVE.
 - DETAILS OF DIRECTIONAL SIGNAGE FOR TRAFFIC INCLUDING NATIONAL CYCLE NETWORK AND BICESTER VILLAGE SHALL BE DEVELOPED AT DETAILED DESIGN STAGE.
 - HEIGHT RESTRICTION BARRIERS TO BE INSTALLED AT CAR PARK ENTRANCES/ EXITS.
 - BUS STOPS TO INCLUDE REAL TIME PASSENGER INFORMATION, SHELTERS, KERBS AND MARKINGS TO BE PROVIDED TO OCC STANDARDS.
 - CYCLISTS TO DISMOUNT ON FOOTWAY AND WALK CYCLES TO RACKS ADJACENT TO STATION BUILDING.
 - TYPE OF CROSSING TO BE ASSESSED AT DETAILED DESIGN STAGE IN CONJUNCTION WITH BUS STOP POSITIONS.
 - STATUTORY UTILITIES NOT SHOWN FOR CLARITY. PLEASE REFER TO STATUTORY UNDERTAKERS UTILITIES DRAWINGS FOR INFORMATION.
 - REFER TO DRAINAGE DRAWING 5114534-ATK-DRG-DR-023308 FOR AREA OF ATTENUATION AND DRAINAGE DETAILS.
 - FOR LIGHTING AND CCTV DETAILS COVERING CAR PARK LAYOUT REFER TO DRAWINGS 5114534-ATK-DRG-TL-000018 & 5114534-ATK-DRG-EP-000300.

This drawing includes map data licensed from Ordnance Survey, © Crown copyright and database rights 2013 Ordnance Survey 0100040692.

<p>Key:</p> <ul style="list-style-type: none"> EXISTING NETWORK RAIL/LAND BOUNDARY PLANNING BOUNDARY TACTILE PAVING PROPOSED TREE SPACES FOR NETWORK RAIL MAINTENANCE VEHICLES SOFT LANDSCAPING PROPOSED CAR PARK TICKET VENDING MACHINE PROPOSED BOUNDARY FENCE PROPOSED STATION PLATFORM POTENTIAL REDUCTION OF CAR PARK SPACES (SEE NOTE 2) PROPOSED SECURITY BOLLARD INDICATIVE OUTLINE OF UPPER DECK (NOT A PART OF THESE WORKS) PROPOSED LIGHTING COLUMN PROPOSED CCTV COLUMN EXISTING SPOT LEVEL 	<p>SCALE: See Scale Bar</p> <p>SIZE: A3</p> <p>PROJECT: 0221083</p> <p>DATE: 30/01/2014</p>	<p>VERSION: A01</p> <p>DRAWN: JD</p> <p>CHECKED: JL</p> <p>APPROVED: LC</p>
	<p>Bicester Station Proposed Layout Plan Figure 2</p>	
		<p>CLIENT:</p> <p></p>

Drawing Number
5114534-ATK-DRG-GE-003031 A01

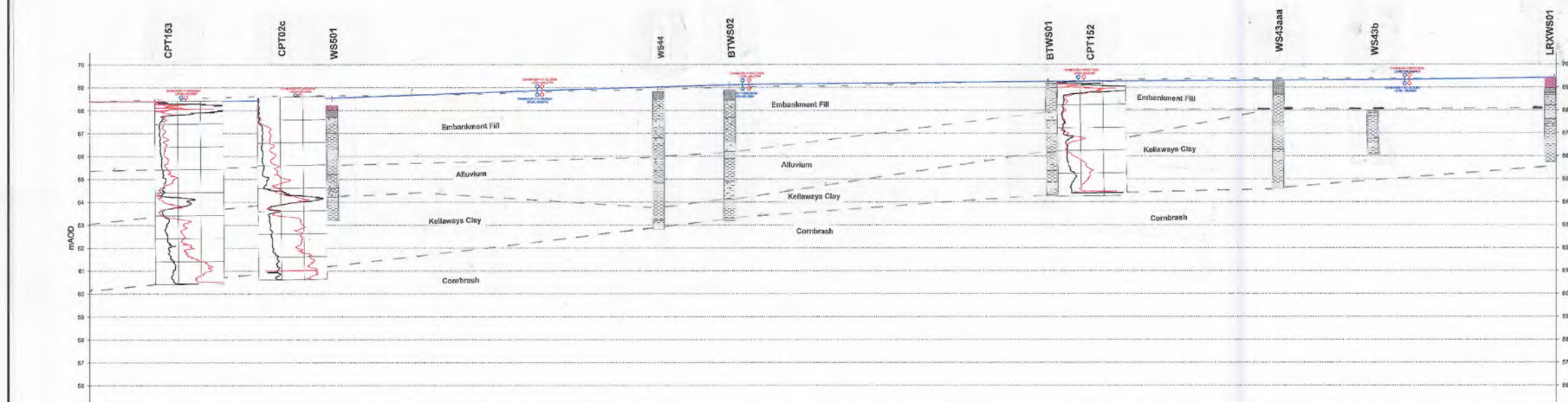
MATCHLINE FOR CONTINUATION SEE DRG. No. 5114534-ATK-DRG-GE-002030



- Legend/Notes
- WINDOWLESS SAMPLER BOREHOLE - TRACKED RIG/GEOTOOL
 - ROAD - RAIL CPT
 - HAND HELD WINDOWLESS SAMPLER BOREHOLE
 - ROTARY BOREHOLE
 - CABLE PERCUSSIVE BOREHOLE
 - HAND DUG TRIAL PIT
 - TRACKBED GI (PROPOSED)
 - EXISTING LEVELS
 - DESIGN LEVEL UP
 - DESIGN LEVEL DOWN
 - APPROXIMATE STRATA BOUNDARY
 - VERY UNCERTAIN STRATA BOUNDARY

- NOTES:
1. EXPLORATORY HOLE LOCATIONS ARE BASED ON INFORMATION PROVIDED ON LOGS AND ARE APPROXIMATE.
 2. FOR SOME EXPLORATORY HOLES, LEVELS HAVE BEEN ESTIMATED FROM EXTRAPOLATION OF TOPOGRAPHIC SURVEY DATA AND ARE APPROXIMATE.
 3. STRATA FORMATION IDENTIFICATION IS INTERPRETED ON LOG DESCRIPTIONS AND BRITISH GEOLOGICAL SURVEY DATA.
 4. STRATA BOUNDARIES ARE BASED ON INTERPRETATION AND EXTRAPOLATION OF THE EXPLORATORY HOLES SHOWN AND BGS PUBLISHED DATA AND IS CONSIDERED APPROXIMATE AND CONJECTURE.
 5. FOR CLARITY, SOME EXPLORATORY HOLES HAVE BEEN OMITTED FROM THE LONG SECTION WHERE THE LOGS HAVE INDICATED SHALLOW REFUSALS, DUPLICATE INFORMATION WHERE THERE ARE CLUSTERS OF HOLES OR SHOW NO PERTINENT INFORMATION.

PLAN
Scale 1:1000



LONG SECTION
Scale H=1:1000 V=1:100

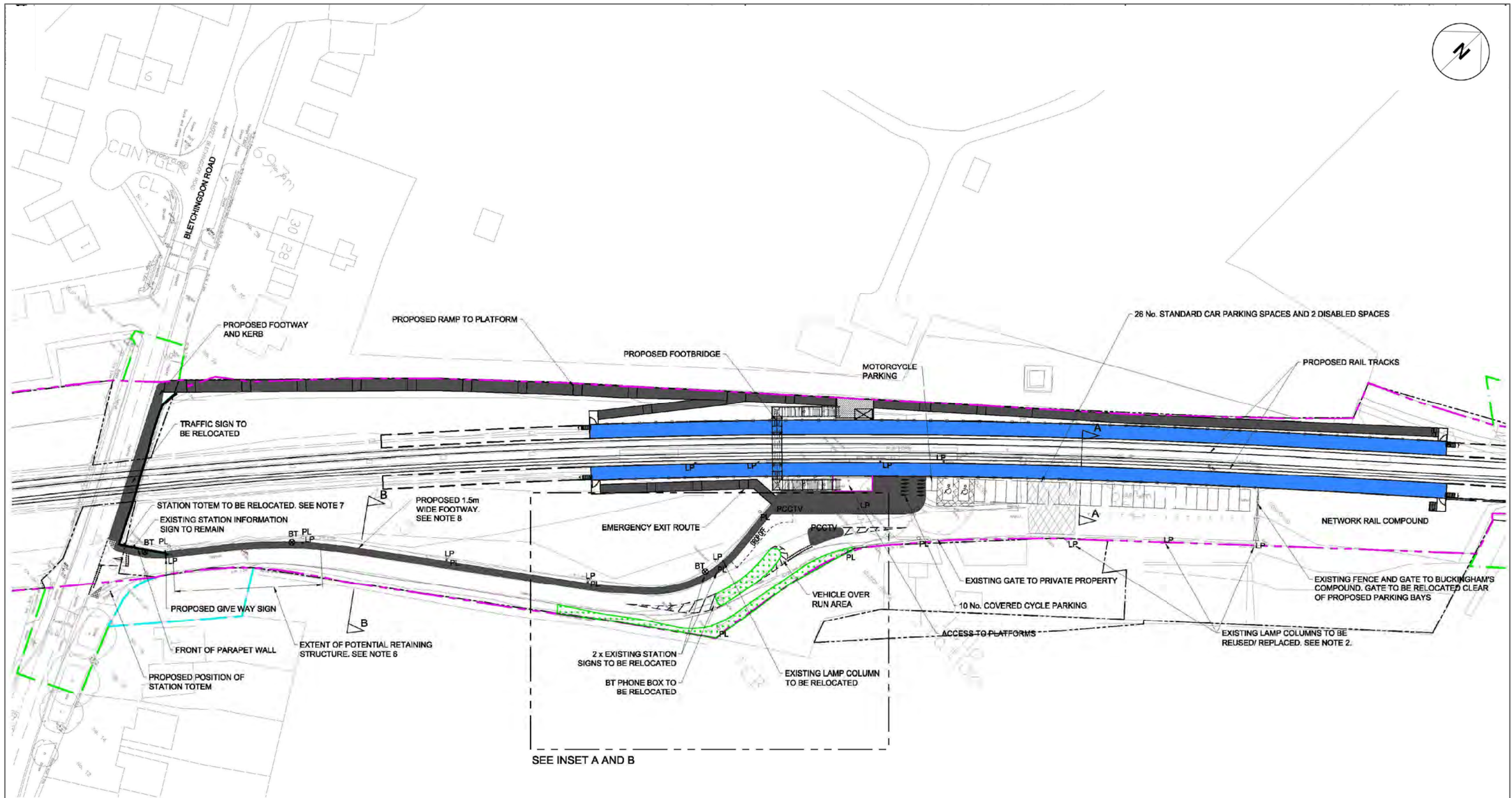
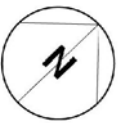
CHAINAGE	UP BLETCHLEY DESIGN LEVEL	UP BLETCHLEY EXISTING LEVEL	DOWN BLETCHLEY DESIGN LEVEL	DOWN BLETCHLEY EXISTING LEVEL
111540	66.45	66.45	66.45	66.45
111560	66.45	66.45	66.45	66.45
111580	66.45	66.45	66.45	66.45
111600	66.45	66.45	66.45	66.45
111620	66.45	66.45	66.45	66.45
111640	66.45	66.45	66.45	66.45
111660	66.45	66.45	66.45	66.45
111680	66.45	66.45	66.45	66.45
111700	66.45	66.45	66.45	66.45
111720	66.45	66.45	66.45	66.45
111740	66.45	66.45	66.45	66.45
111760	66.45	66.45	66.45	66.45
111780	66.45	66.45	66.45	66.45
111800	66.45	66.45	66.45	66.45
111820	66.45	66.45	66.45	66.45
111840	66.45	66.45	66.45	66.45
111860	66.45	66.45	66.45	66.45
111880	66.45	66.45	66.45	66.45
111900	66.45	66.45	66.45	66.45
111920	66.45	66.45	66.45	66.45
111940	66.45	66.45	66.45	66.45
111960	66.45	66.45	66.45	66.45
111980	66.45	66.45	66.45	66.45
112000	66.45	66.45	66.45	66.45
112020	66.45	66.45	66.45	66.45
112040	66.45	66.45	66.45	66.45
112060	66.45	66.45	66.45	66.45
112080	66.45	66.45	66.45	66.45
112100	66.45	66.45	66.45	66.45
112120	66.45	66.45	66.45	66.45
112140	66.45	66.45	66.45	66.45
112160	66.45	66.45	66.45	66.45
112180	66.45	66.45	66.45	66.45
112200	66.45	66.45	66.45	66.45
112220	66.45	66.45	66.45	66.45
112240	66.45	66.45	66.45	66.45
112260	66.45	66.45	66.45	66.45
112280	66.45	66.45	66.45	66.45
112300	66.45	66.45	66.45	66.45
112320	66.45	66.45	66.45	66.45
112340	66.45	66.45	66.45	66.45
112360	66.45	66.45	66.45	66.45
112380	66.45	66.45	66.45	66.45
112400	66.45	66.45	66.45	66.45
112420	66.45	66.45	66.45	66.45
112440	66.45	66.45	66.45	66.45
112460	66.45	66.45	66.45	66.45
112480	66.45	66.45	66.45	66.45
112500	66.45	66.45	66.45	66.45
112520	66.45	66.45	66.45	66.45
112540	66.45	66.45	66.45	66.45
112560	66.45	66.45	66.45	66.45
112580	66.45	66.45	66.45	66.45
112600	66.45	66.45	66.45	66.45
112620	66.45	66.45	66.45	66.45
112640	66.45	66.45	66.45	66.45
112660	66.45	66.45	66.45	66.45
112680	66.45	66.45	66.45	66.45
112700	66.45	66.45	66.45	66.45
112720	66.45	66.45	66.45	66.45
112740	66.45	66.45	66.45	66.45
112760	66.45	66.45	66.45	66.45
112780	66.45	66.45	66.45	66.45
112800	66.45	66.45	66.45	66.45
112820	66.45	66.45	66.45	66.45
112840	66.45	66.45	66.45	66.45
112860	66.45	66.45	66.45	66.45
112880	66.45	66.45	66.45	66.45
112900	66.45	66.45	66.45	66.45
112920	66.45	66.45	66.45	66.45
112940	66.45	66.45	66.45	66.45
112960	66.45	66.45	66.45	66.45
112980	66.45	66.45	66.45	66.45
113000	66.45	66.45	66.45	66.45

SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: JD
PROJECT: 0221083	CHECKED: CB
DATE: 30/01/2014	APPROVED: LC

**Bicester Station
Borehole Location Plan
Figure 3**

CLIENT:



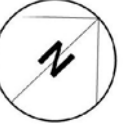
SEE INSET A AND B

- Notes:**
- LAYOUT IS BASED UPON OS TILE DATA PROVIDED BY NETWORK RAIL (© CROWN COPYRIGHT AND DATABASE RIGHTS 2013 ORDINANCE SURVEY 0100040692), AERIAL SURVEY UNDERTAKEN BY ATKINS IN AUGUST 2009 AND TOPOGRAPHICAL SURVEY UNDERTAKEN BY ATKINS IN MAY 2013. ALL DIMENSIONS TO BE CHECKED AND VERIFIED ON SITE.
 - REFER TO LIGHTING DRAWINGS 5114534-ATK-DRG-TL-000012 FOR DETAILS OF CAR PARK LIGHTING.
 - FOR DRAINAGE DETAILS INCLUDING ATTENUATION REFER TO DRAWING 5114534-ATK-DRG-DR-023307.
 - FOR CCTV DETAILS REFER TO DRAWING 5114534-ATK-DRG-TL-000012.
 - STATUTORY UTILITIES ARE NOT SHOWN FOR CLARITY. REFER TO STATUTORY UTILITIES CO-ORDINATION DRAWING.
 - LOCALISED RETAINING STRUCTURE REQUIRED AT BACK OF FOOTWAY. APPROX LENGTH REQUIRED 33m TO BE DESIGNED AT DETAILED DESIGN STAGE.
 - EXISTING TOTEM POSITION CREATES PINCH POINT ON FOOTWAY. TOTEM REPOSITIONED.
 - FOOTWAY WIDTH AROUND PARAPET WALL REDUCES TO 1m AT PINCH POINT. ACCESS ROAD AT THIS LOCATION TO BE TRAFFIC SINGLE FILE.

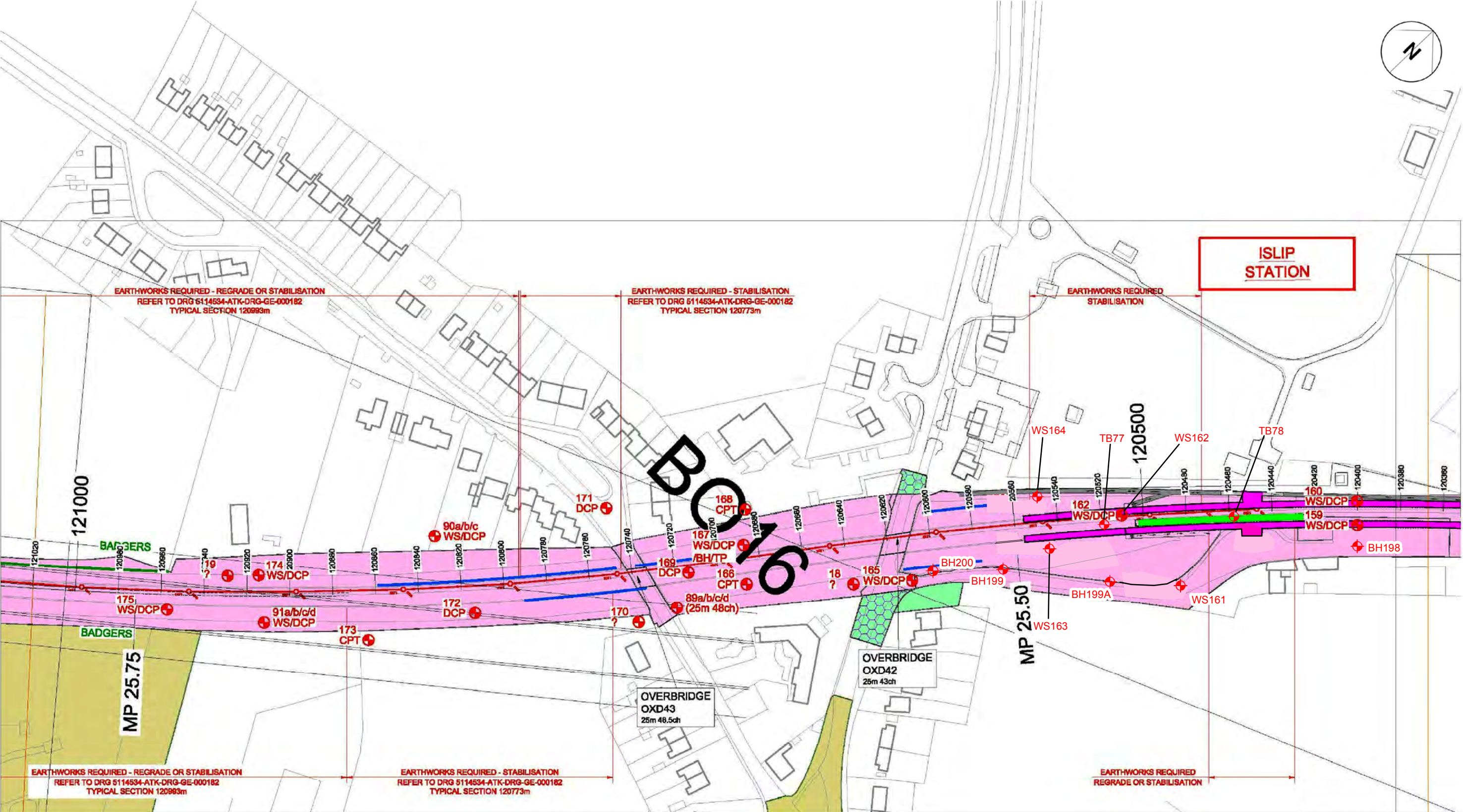
This drawing includes map data licensed from Ordnance Survey, © Crown copyright and database rights 2013 Ordnance Survey 0100040692.

Key: 	EXISTING NETWORK RAIL LAND BOUNDARY LIMIT OF DEVIATION LIMITS OF LAND TO BE ACCESSED TEMPORARILY LIMITS OF LAND TO BE ACCESSED PERMANENTLY PROPOSED FENCE (TYPE TRC) EXISTING LAMP COLUMN TO BE RELOCATED EXISTING BT BOX TO BE RELOCATED BT PHONE BOX TO BE RELOCATED TACTILE PAVING AREA OF PROPOSED SOFT LANDSCAPING PROPOSED STATION PLATFORM VEHICLE BOLLARD (DOLLAR TO FAS 68 (TRC)) PROPOSED LIGHTING COLUMN (SEE NOTE 4) PROPOSED CCTV COLUMN (SEE NOTE 2) PROPOSED ROAD SIGN	SCALE: See Scale Bar SIZE: A3 PROJECT: 0221083 DATE: 03/02/2014	VERSION: A01 DRAWN: JD CHECKED: CB APPROVED: LC
	Islip Station Proposed Layout Plan Figure 4		CLIENT:

PROJECTION: British National Grid



**ISLIP
STATION**

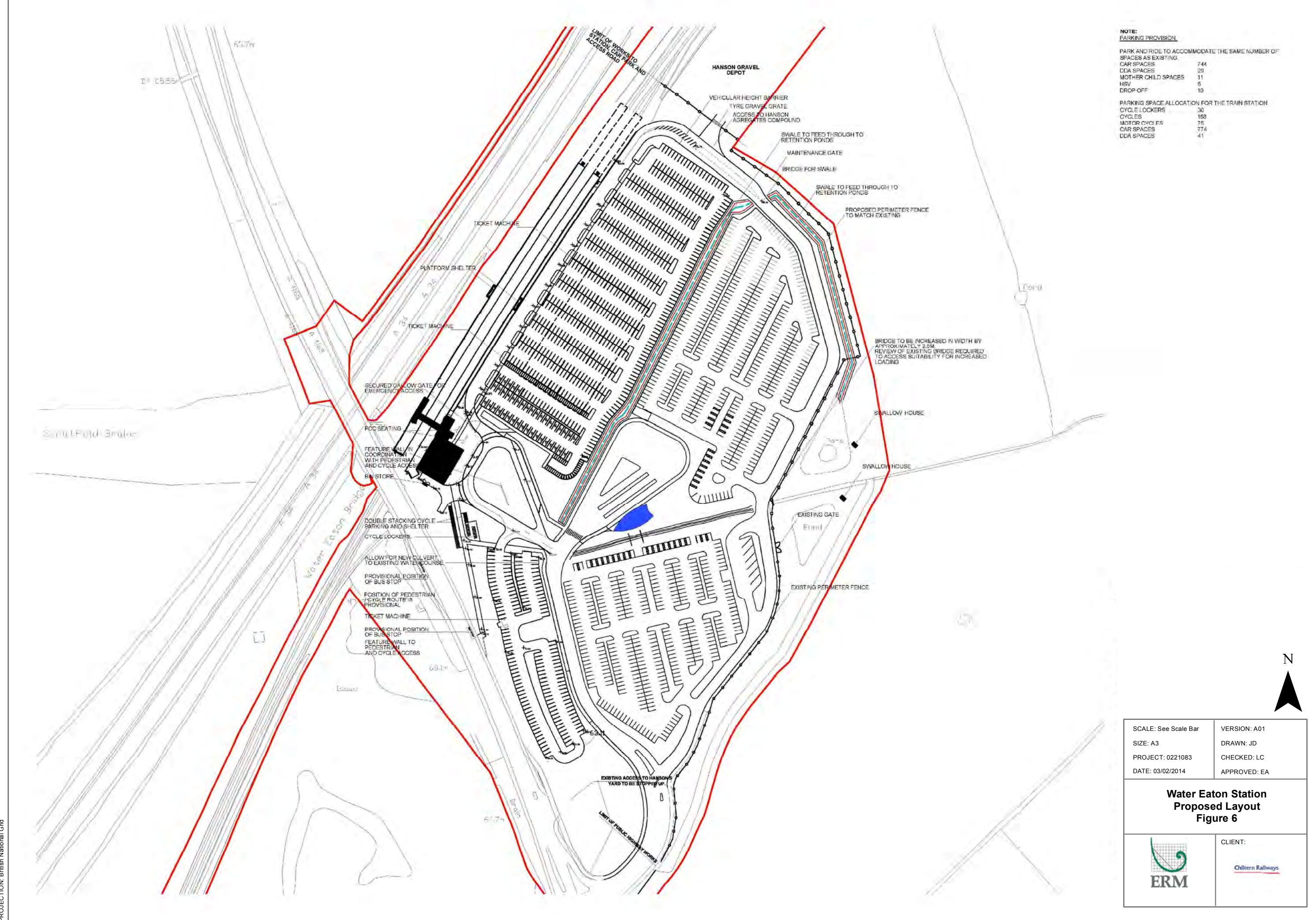


SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: JD
PROJECT: 0221083	CHECKED: JL
DATE: 03/02/2014	APPROVED: LC

**Islip Station
Borehole Locations
Figure 5**

	CLIENT:

PROJECTION: British National Grid



NOTE:

PARKING PROVISION

PARK AND RIDE TO ACCOMMODATE THE SAME NUMBER OF SPACES AS EXISTING

CAR SPACES	744
DDA SPACES	23
MOTHER CHILD SPACES	11
HSV	6
DROP OFF	10

PARKING SPACE ALLOCATION FOR THE TRAIN STATION

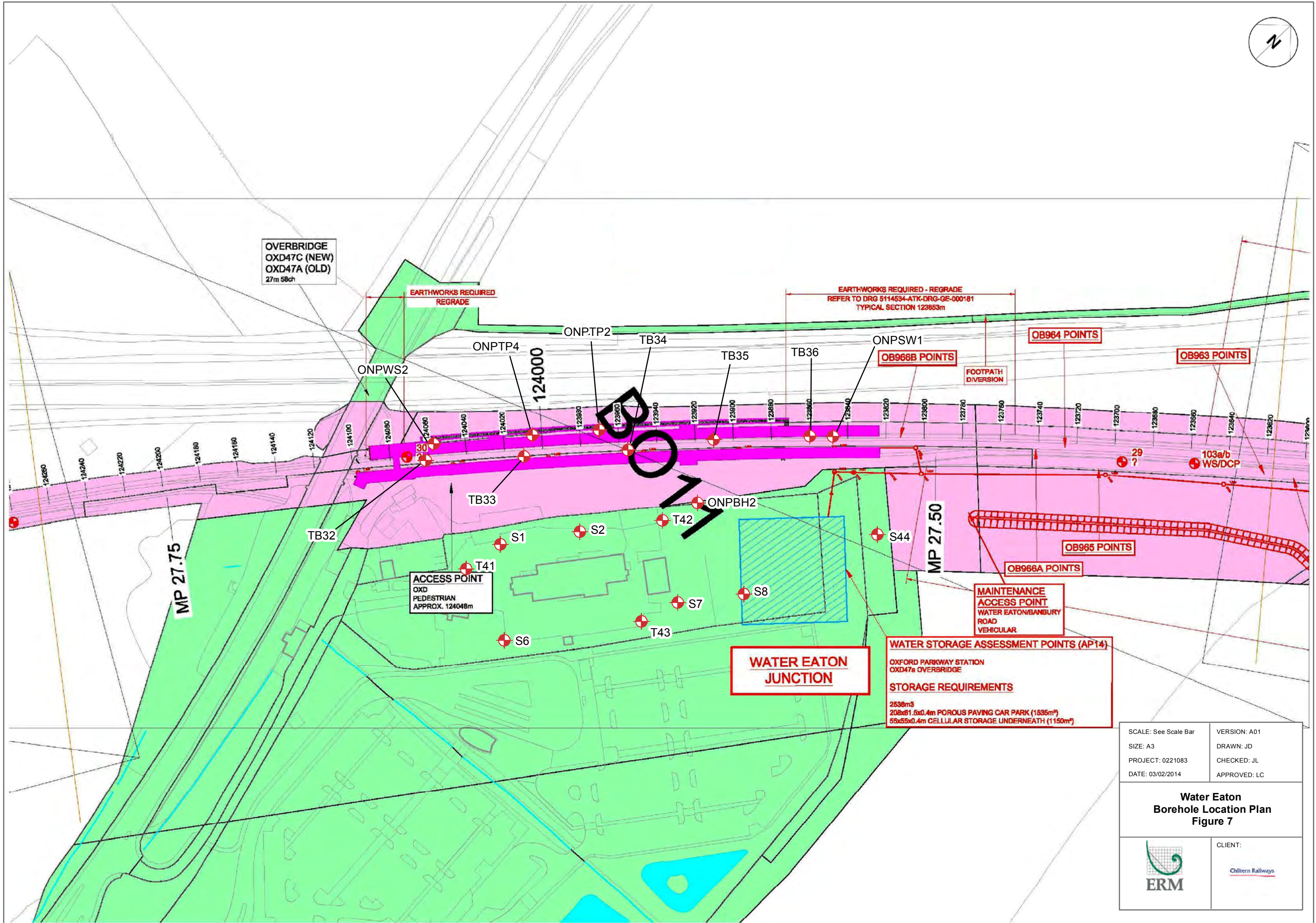
CYCLE LOCKERS	30
CYCLES	168
MOTOR CYCLES	75
CAR SPACES	774
DDA SPACES	41

SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: JD
PROJECT: 0221083	CHECKED: LC
DATE: 03/02/2014	APPROVED: EA

**Water Eaton Station
Proposed Layout
Figure 6**

	CLIENT:

PROJECTION: British National Grid



OVERBRIDGE
OXD47C (NEW)
OXD47A (OLD)
27m 58ch

EARTHWORKS REQUIRED
REGRADE

EARTHWORKS REQUIRED - REGRADE
REFER TO DRG 5114534-ATK-DRG-GE-000181
TYPICAL SECTION 123653m

OB964 POINTS

OB963 POINTS

OB966B POINTS

FOOTPATH
DIVERSION

MP 27.75

ACCESS POINT
OXD
PEDESTRIAN
APPROX. 124048m

MAINTENANCE
ACCESS POINT
WATER EATON/BANGBURY
ROAD
VEHICULAR

WATER EATON
JUNCTION

WATER STORAGE ASSESSMENT POINTS (AP14)
OXFORD PARKWAY STATION
OXD47a OVERBRIDGE
STORAGE REQUIREMENTS
2536m3
208x61.5x0.4m POROUS PAVING CAR PARK (1535m²)
55x55x0.4m CELLULAR STORAGE UNDERNEATH (1150m²)

SCALE: See Scale Bar	VERSION: A01
SIZE: A3	DRAWN: JD
PROJECT: 0221083	CHECKED: JL
DATE: 03/02/2014	APPROVED: LC

**Water Eaton
Borehole Location Plan
Figure 7**

	CLIENT: