Land at Thurnscoe
South Yorkshire

Flood Risk & Drainage Impact Assessment

JBA Consulting

July 2006
(Updated October 2009)

DRAFT

Keepmoat Homes Ltd
The Waterfront
Lakeside Boulevard
DONCASTER
DN4 5PL

For the attention of Stacey Chappell, Development Manager

Your Ref: SC/SW/7173
Our Ref: CW\2009s0518-D-L001-1

15 October 2009

Dear Sirs,

Proposed Development Reema Estate Thurnscoe
Addendum to the Flood Risk Assessment dated July 2006

With reference to your letter dated 14 October, we are pleased to provide below the addendum to the July 2006 Flood Risk Assessment (FRA) submitted with the Outline Planning Application dated July 2006 (Barnsley MBC Ref 2006/1221).

The changes that require the FRA to be amended are summarised as follows:-

1. References to PPG25 are changed to references to PPS25
2. Barnsley MBC requires a reduction in surface water discharge rates of 30% from pre-development rates compared with 20% at the time of the July 2006 report as well as an increase in the climate change allowance in the 1 in 100 year storm event storage from 20% to 30%.
3. Yorkshire Water has programmed an upgrade to Bolton Waste Water Treatment Works by March 2015, subject to Ofwat approval.

These changes have resulted in the following sections being amended as described.

Report Section 1.1 Proposal

The contents of this section are replaced by the following:-

Barnsley Metropolitan Borough Council (MBC) in partnership with Chevin Housing obtained outline planning permission from an application made in July 2006 for a housing development on approximately 19.5ha of land off School Street, Thurnscoe.

JBA Consulting was engaged by Chevin Housing to provide a Flood Risk and Drainage Impact Assessment for the development based on information currently available. This included commenting on the likely environmental impact of drainage of the development on the existing watercourse.

JBA Consulting was also engaged to make contact with the public utility service providers and to obtain their comments on the provision of future supplies to the development.

Keepmoat Homes is now making a further application for planning permission for the development.

The proposals include demolition of the existing 'Reema' housing estate off School Street. This estate, consisting of approximately 190 dwellings on an area of approximately 6.1ha of land, was constructed in the 1960s. The buildings have become structurally defective.

The proposed total number of dwellings on the completed site will be in the region of 880.

The existing land and development drains surface water to a watercourse which was culverted by the Dearne Urban District Council in the early 1970s.

JBA Consulting has been engaged by Keepmoat Homes Ltd. to provide an update to the Flood Risk and Drainage Impact Assessment and this addendum provides that update to the original Flood Risk Assessment dated July 2006.

Report Section 1.2 Flood Risk and Drainage Impact

The contents of this section are replaced by the following:-

Guidance on the assessment of flood risk is provided in the Planning Policy Statement 25 Development Flood Risk (PPS25) published by the Department for Communities and Local Government in October 2006. A Practice Guide Companion to PPS25 in the form of a Consultation Paper has been published by the Department for Communities and Local Government (PPS25 Practice Guide).

All development sites should have flood risk assessed to Level 1 as defined in the PPS25 Practice Guide. This is to identify if there are any flooding or surface water management issues related to the development. If there are such issues, then a Level 2 Scoping Study and/or a Level 3 Detailed Study will be required.

In this case, a Level 2 study has been carried out as it is clear that the development will have an impact on the receiving watercourse as well as the foul sewerage system.

PPS25 defines flood zones as follows:-

Zone 1 Low Probability - less than 1 in 1000 annual probability (< 0.1%) of river or sea flooding in any year

Zone 2 Medium Probability - between a 1 in 100 and 1 in 1000 annual probability (1% - 0.1%) of river flooding or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5%-0.1%) in any year

Zone 3a High Probability - 1 in 100 or greater annual probability (> 1%) of river flooding or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year

Zone 3b Functional Floodplain - 1 in 20 or greater annual probability (5%) of river flooding in any year. This is land on which water has to flow or be stored in times of flood.

A Flood Risk Assessment is required for sites in excess of 1 hectare (ha) within Zone 1 and all sites within Zones 2 and 3.

The site lies in Flood Zone 1 but as the site area exceeds 1ha, a flood risk assessment is required.

This report makes recommendations for the mitigation of flood risk to and as a result of the development.

PPS25 recommends that a risk based sequential test should be applied at all stages of planning where the proposed development lies within Flood Zones 2 and 3 to encourage development towards Flood Zone 1. As the development lies in Flood Zone 1, the sequential test is not required as part of the flood risk assessment.

Report Section 1.3.2 Consultations - Barnsley MBC Drainage

The Barnsley MBC policy regarding reduction in surface water discharge rates on new developments to allow for the effects of future climate change now requires a reduction of 30% compared to 20% described in the original FRA. Therefore, the surface water discharge from the development is to be restricted as follows:-

- From the existing Reema estate - existing discharge less 30% to allow for future climate change.
- From the agricultural land – 4l/s/ha. This may be modified if it can be shown that the modified flow would not be detrimental.

and surface water storage should be provided to ensure that there is no surcharge in the 1 in 2 year storm, no surface flooding in the 1 in 30 year storm and no internal flooding of properties in the 1 in 100 year storm, plus 30% climate change allowance.

The remainder of this section remains valid.

Report Section 1.3.3 Consultations - Yorkshire Water Sewage Treatment

The contents of this section are replaced by the following:-

At the time of the first application, a discussion was held with the Waste Water Treatment Planning Manager. The development was described as the replacement of approximately 188 dwellings with 880, an increase of 700 say, phased between 2008 and 2022.

The Planning Manager confirmed that there was insufficient capacity at the existing works for this number of new dwellings.

We now understand that Yorkshire Water is proposing an upgrade to the Bolton Waste Water Treatment Works (WWTW) with work complete by March 2015. This proposal is subject to Ofwat approval which is expected in December 2009. Until the WWTW upgrade is complete, Yorkshire Water will limit the number of dwelling units connected to the foul sewer system to the existing Reema units plus 190 new units, giving a total of 262 units.

This number of dwelling units can only be exceeded before the upgrade is complete if the upgrade is brought forward with subsequent costs being recharged to the developer.

Report Section 1.3.5 Consultations - Environment Agency – Development Control

The contents of this section are replaced by the following:-

A first draft of this report was reviewed by Roger Dixon at the Environment Agency. He agreed with the basis of the proposed flow restrictions as recommended by the Barnsley MBC Drainage Engineer as described above.

In the Agency's response to the original planning application, they stated they would not object to the proposal on flood risk grounds providing the recommendations of the FRA were incorporated into the design of the development.

Report Section 2.3.3 Drainage Impact Assessment - Sewage Treatment

The contents of this section are replaced by the following:-

Yorkshire Water has stated that there is insufficient capacity at the Bolton WWTW to accept flows from the whole development. It will therefore be necessary for Yorkshire Water to increase the capacity at the WWTW and they propose to carry out an upgrade

by March 2015. This will provide sufficient capacity to accept flows from the whole development.

Yorkshire Water has stated that there is sufficient capacity at the WWTW to enable the existing Reema dwelling units to be replaced and for an additional 190 new units.

Providing the WWTW capacity increase is provided at the appropriate time and before 190 dwelling new units in addition to replacing the existing Reema units is carried out, the impact of the development on sewage treatment will below.

Report Section 6.3 Public Utilities – Yorkshire Water – Sewerage

The contents of this section are replaced by the following:-

The responses regarding sewerage and sewage treatment have been described above.

Foul sewage may be discharged to the existing 225mm diameter public combined sewer in Oak Road and Yorkshire Water considers that surface water could drain to the existing watercourse across the site.

Discussions with the Planning Manager for sewage treatment revealed that the existing Bolton WWTW does not have sufficient capacity to accommodate the whole proposed development. Improvements will be required to increase capacity and upgrades are planned to be completed by March 2015 which will enable acceptance of discharge of foul sewage from the whole development. Until the upgrade is complete, Yorkshire Water will accept flow from the replacements for the existing Reema dwelling units to be demolished plus an additional 190 new units.

Report Section 3.1 Outline Drainage Proposals – Surface Water

The increase in design rainfall to allow for the effect of future climate change from 20% in the report to 30% as now required by Barnsley MBC (Section 1.3.2 above) will result in increases in the approximate storage volumes required (Table 3-1 in the report) to as follows:-

	1 in 30 year Volume m^3	1 in 100 year Volume m^3
Phase 1	630	940
Phase 2	1360	1910

and the equivalent pipe lengths will also change.

Detailed design of the proposed surface water flow restriction and storage volumes will be carried out using the guidance contained in the report as updated by this addendum.

The remainder of the July 2006 FRA report remains valid.

Please let me know if you require any clarification of the above.

Yours faithfully,
For **Jeremy Benn Associates Limited**

Christopher Wright
Team Leader
christopher.wright@jbaconsulting.co.uk

jba CONSULTING

Chevin Housing Association Ltd.

Flood Risk & Drainage Impact Assessment Reema Estate & Adjacent Land Thurnscoe Barnsley

July 2006

FINAL REPORT

JBA Consulting
Denison House
Hexthorpe Road
Doncaster
South Yorkshire
DN4 0BF
UK
t: +44 (0)1302 342055
f: +44 (0)1302 329887
www@jbaconsulting.co.uk

Chevin Housing Association Ltd.
2 Carbrook Street
Carbrook
Sheffield
S9 2JE

REVISION HISTORY

Revision Ref./ Date Issued	Amendments	Issued to
Report Stage - Final Draft Date of Report – July 2006		Indigo Planning Ltd. – Jim Ramsey Number of copies – 10 copies

CONTRACT

This report describes work commissioned by Chevin Housing Association Ltd. under a letter of instruction dated 4 April 2006. Chevin Housing Association Ltd. representative for the contract was Christine Clegg. Chris Wright of JBA Consulting carried out the work.

Prepared by: ..... Christopher Wright BSc, CEng, MICE
Principle Engineer

Reviewed by: ..... *Geoffrey Heald EngTech, TMICE*
Senior Engineer

Approved by: ..... Richard Buck BEng, CEng, MICE, MCIWEM
Director

PURPOSE

This document has been prepared *solely* as a flood risk and drainage impact assessment report for Chevin Housing Association Ltd. JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.

JBA Consulting has no liability regarding the use of this report except to Chevin Housing Association Ltd. If the site is sold, the scope of the development changed, or this report is provided to third parties then any liability or explicit or implied warranty is voided.

This page is intentionally left blank.

EXECUTIVE SUMMARY

Executive Summary Heading

This report provides a flood risk and drainage impact assessment for the proposed development by Barnsley Metropolitan Borough Council (MBC), in partnership with Chevin Housing, of the existing 'Reema' housing estate and adjacent land in Thurnscoe. The total development area is 19.5ha and the total number of dwellings will be in the region of 880. It is intended that this report is included in the outline planning application to be made by Barnsley MBC.

The site lies outside the floodplain described on the Environment Agency flood maps. As a result, this assessment considers flood risk from and the impact of the development on watercourses and sewers.

Consultations with the Barnsley MBC Drainage Engineer, Yorkshire Water, the tenant farmer and the Environment Agency are reported as well as initial correspondence with public utility service providers.

Recommendations are included regarding design of drainage systems to serve the development, in accordance with the requirements of the regulatory authorities.

An outline environmental appraisal of the effect of the development on the existing watercourse is included.

Outline recommendations for the design of the drainage systems include restricting the surface water discharge rate with on site attenuation and storage together with a capacity increase at the Bolton Waste Water Treatment Works.

The report concludes that providing drainage systems on the site and capacity improvements off site are designed according to the outline recommendations, then the risk of flooding of the site and the impact of the development on existing drainage systems will both be low.

This page is intentionally left blank.

CONTENTS

APPENDICES:

APPENDIX A: - LOCATION PLAN

LIST OF TABLES

1 BACKGROUND

1.1 Proposal (See Location Plan at Appendix A)

Barnsley Metropolitan Borough Council (MBC) is proposing to apply for outline planning permission for a housing development on approximately 19.5ha of land off School Street, Thurnscoe. The proposals include demolition of the existing 'Reema' housing estate off School Street. This estate, consisting of approximately 190 dwellings on an area of approximately 6.1ha of land, was constructed in the 1960s. The buildings have become structurally defective.

Chevin Housing Association Ltd. has entered a partnership with Barnsley MBC to implement the development

The proposed total number of dwellings on the completed site will be in the region of 880.

It is proposed to phase the development such that the southern part of the site (9.35ha approximately) would be developed from 2008 to 2014 and the northern part from 2014 to 2022.

The existing land and development drains surface water to a watercourse which was culverted by the Dearne Urban District Council in the early 1970s.

JBA Consulting has been engaged by Chevin Housing Association Ltd. to provide an outline Flood Risk and Drainage Impact Assessment for the development based on information currently available. This includes commenting on the likely environmental impact of drainage of the development on the existing watercourse.

JBA Consulting has also been engaged to make contact with the public utility service providers and to obtain their comments on the provision of future supplies to the development.

1.2 Flood Risk and Drainage Impact

Planning and Policy Guideline 25 (PPG 25) recommends that developers consider the risk of flooding to a proposed development and the effect of the development on the risk of flooding to land in the vicinity of the development and elsewhere.

PPG 25 recommends that consideration be given to using sustainable methods of disposal of surface water from the development where possible in order to reduce the impact of the development on existing drainage systems.

This assessment uses information gathered from various sources.

1.3 Consultations and Information Gathering

The following have been consulted regarding flood risk and drainage impact of the development.

- Barnsley MBC Drainage Engineer
- Yorkshire Water Sewerage New Development Team
- Yorkshire Water Sewage Treatment Section
- Mr Richardson – tenant farmer of the agricultural land on the development site.
- Environment Agency – Development Control

1.3.1 Barnsley MBC Drainage

A plan of the Reema development showing main drains and sewers has been supplied by Barnsley MBC.

This shows that the development discharges surface water to the culverted watercourse in the north west corner of that development. Details of the culvert at this point are incomplete but further drawings provided by Barnsley MBC show the culverted watercourse some 100m downstream as a nominal 825mm pipe.

The Barnsley MBC Drainage Engineer reported that the watercourse is culverted downstream through the built up area of Thurnscoe to the Lorne Road/Rectory Lane area where it changes to open watercourse. He said that there have been localised flooding problems on the line of the watercourse in the past and he has therefore requested restrictions on discharge rate into the watercourse. These are described below.

The Reema development plan shows the surface water drainage system serving the highways and footways with connections shown heading towards the houses. It is possible that at least part of the house roofs drain to the surface water system but it is also possible that part of the roof drainage discharges to the foul system. It will be necessary to carry out tests on site to confirm the above.

Barnsley MBC is the land drainage authority for the site and the Drainage Engineer provides advice and makes recommendations to the Planning Officer on land drainage matters. The Drainage Engineer has stated that he will recommend that surface water discharge from the development is restricted as follows:-

- From the existing Reema estate:- existing discharge less 20% to allow for future climate change.
- From the agricultural land – 4l/s/ha. This may be modified if it can be shown that the modified flow would not be detrimental.

In addition, the Drainage Engineer said that the Council would resist the provision of attenuation ponds on this site due to the potential problems of maintenance and vandalism.

1.3.2 Yorkshire Water Sewerage

The information provided by Yorkshire Water included a copy of the sewer map. This shows the existing Reema estate draining via foul sewers into a 225mm diameter foul sewer in Low Grange Square just outside the south west corner of the site.

Yorkshire Water stated that foul sewage from the new development can discharge to the 225mm diameter public sewer in Oak Road. This sewer continues to the sewer in Low Grange Square referred to above.

Yorkshire Water stated that sustainable drainage systems should be considered for disposal of surface water from the development. They accept that in this case, the ground conditions are unlikely to be suitable for infiltration techniques resulting in the requirement to discharge into local watercourses.

Drainage of surface water into the foul drainage system will not be permitted by Yorkshire Water.

1.3.3 Yorkshire Water Sewage Treatment

A discussion was held with the Waste Water Treatment Planning Manager. The development was described as the replacement of approximately 188 dwellings with 880, an increase of 700 say, phased between 2008 and 2022.

The Planning Manager confirmed that there is insufficient capacity at the existing works for this number of new dwellings and she will request a planning condition such that no development will take place until there is sufficient treatment capacity at Bolton Waste Water Treatment Works (WWTW).

The existing plant is based on filter treatment so it may be possible to replace the plant and provide capacity increase without a requirement for an increase in the land area of the works. Yorkshire Water will require the developer to make a significant contribution towards the cost of any capacity increase. This capacity increase may include the bringing forward of planned plant replacement.

1.3.4 Mr Richardson – Tenant Farmer

In discussions, Mr Richardson confirmed that the watercourse crossing the field to the north of the Reema estate had been culverted some time ago but was unsure of the size of pipe used. He said that flows in the watercourse at times exceeded the capacity of the pipe resulting in water running on the surface above the pipe.

He confirmed that the small pond shown on Ordnance Survey maps on the northern boundary of the proposed site was filled in by the previous owner many years ago.

He was not aware of any springs on the surface of the field and said that the field boundary ditches were excavated to deter unauthorised entry to the fields and were not intended to drain the fields.

1.3.5 Environment Agency – Development Control

A first draft of this report has been reviewed by Roger Dixon at the Environment Agency. He has agreed with the basis of the proposed flow restrictions as recommended by the Barnsley MBC Drainage Engineer as described above.

This page is intentionally left blank.

2 ASSESSMENT OF FLOOD RISK AND DRAINAGE IMPACT

2.1 Walk Over Survey

A walk over survey was undertaken which showed that the line of the watercourse is in a locally steep sided valley within the field to the north of the Reema estate. Water was running across the cropped surface on the line of the watercourse and passing below ground near the field entrance opposite the junction of Willow Road and Lingamore Leys. There was no flow of water in the field boundary ditches.

At the time of the survey, the field was cropped with rape.

2.2 Flood Risk Assessment

2.2.1 Main River

The site lies within the catchment of the River Dearne. The river lies some 4km to the south of the site. The site ground levels vary from 45 to 60m AOD and the floodplain of the river lies below 22m AOD. Therefore there is no risk of flooding of the development site from the River Dearne.

2.2.2 Local Watercourses

An un-named watercourse runs across the field part of the development site to the north of the Reema estate into a culverted watercourse which leaves the site on the western boundary, passes under developed land to discharge into an open watercourse off Lorne Road where it joins other watercourses south of Rectory Lane. There it becomes a tributary of Thurnscoe Dyke which becomes Carr Dyke before joining the River Dearne.

There is no history of flooding from the watercourse within the development site. The culvert is 825mm diameter downstream of the site and is likely to be of sufficient capacity to adequately drain the existing Reema estate and fields to the north.

The watercourse has been piped across the field by the previous owner. There is evidence of water running on the surface of the field on the line of the watercourse and it is likely that the pipe installed is of insufficient capacity. It is proposed below that this pipe is replaced by a larger pipe to be designed to accommodate the existing flows. The land contours ensure that the surface flow is contained within a few metres of the line of the watercourse.

On the basis that there is no record of flooding on the site and that the surface water discharge from the proposed development is to be restricted as described in this report, then it is considered that the risk of flooding of the development from the watercourse is low.

2.2.3 Public Sewers

There is no record of flooding from the existing public sewers serving the Reema estate.

Foul and surface water sewers will be designed and constructed to Yorkshire Water requirements, to serve the development.

It is proposed that foul sewers will discharge into existing public foul sewers as directed by Yorkshire Water.

The surface water sewer system will be designed to accommodate the increase in discharge rate from the development. The discharge rate into the culverted watercourse will be designed to the requirements of Barnsley MBC and will require a significant volume of storage to be provided upstream of that connection. Taking the flow restriction requirements into account, the design will be based on the following criteria:-

- 1 in 1 year rainfall event – pipes full but not surcharged
- 1 in 30 year rainfall event – no surface flooding
- 1 in 100 year rainfall event – any surface flooding contained within the site at a level 600mm below threshold levels.

On the basis of the above, it is considered that the risk of flooding from public sewers is low.

2.3 Drainage Impact Assessment

2.3.1 Local Watercourses

The development will have an impact on the existing local watercourse. We understand that there have been problems on this watercourse system within Thurnscoe, downstream of the development site. These problems have been due to localised erosion of watercourse banks and partial blockages of culverts. We understand that the problems have not been due to under capacity of the culverted sections.

It is therefore proposed that surface water discharge to this watercourse is restricted to the equivalent of the future discharge from the existing development and agricultural land as required by Barnsley MBC. The outline design criteria are as follows:-

- From the existing Reema estate:- existing discharge less 20% to allow for future climate change.
- From the agricultural land – 4l/s/ha. This may be modified if it can be shown that the modified flow would not be detrimental.

It is therefore considered that providing the surface water discharge from the site is managed as described above, the impact of the development on the existing watercourse will be low.

2.3.2 Public Sewers

The site will drain surface water to the culverted watercourse as described above. There will be no impact on surface water sewers off the site.

Yorkshire Water has stated that foul sewage can be discharged into the existing public 225mm diameter foul sewer in Oak Road. This sewer lies within the Reema estate and may be made redundant or diverted, within the site. The sewer in Oak Road runs to the rear of houses in Willow Road to Low Grange Square and into Low Grange Road, where it becomes 375mm diameter. It is therefore likely that all foul sewage from the development will discharge at the existing public sewer manhole in the south west corner of the site, which is upstream of the sewer running into Low Grange Square.

On the basis that Yorkshire Water will accept discharge into this sewer, the impact of the development on the public sewer system is considered to be low.

2.3.3 Sewage Treatment

Yorkshire Water has stated that there is insufficient capacity at the Bolton WWTW. It will therefore be necessary for Yorkshire Water to increase the capacity at the WWTW and they will require additional capacity to be provided before there is any increase in foul sewage flow from the development.

Further discussions with Yorkshire Water will be necessary to determine the increase in flow which will trigger the requirement for the additional capacity, how that additional capacity will be provided, how it will be financed and what contribution towards the cost will be required from the developer.

Providing the WWTW capacity increase is provided at the appropriate time so as not to overload the existing WWTW, the impact of the development on sewage treatment will be low.

3 OUTLINE DRAINAGE PROPOSALS

3.1 Surface Water

It is proposed that surface water from the development will be drained to the existing watercourse on the western boundary of the site. It will be necessary for discharge rates to be significantly restricted as described below:-

- From the existing Reema estate:- existing discharge less 20% to allow for future climate change.
- From the agricultural land – 4l/s/ha. This may be modified if it can be shown that the modified flow would not be detrimental.

In order to establish whether discharge rates at above the agricultural 4l/s/ha would be acceptable, it would be necessary to model the watercourse throughout its length, downstream to the southern boundary of Thurnscoe. As the watercourse lies within the urban area, it would be necessary to include simulation of blockages occurring in the culverted watercourse and assessment of surface flood routes.

It is proposed at this stage that surface water flows in excess of the allowable discharge rate will be stored in underground pipes or tanks with flow control devices at the outfalls into the watercourse. These storage pipes/tanks would be designed according to Yorkshire Water requirements in order that they may be adopted as part of the public sewer system.

Other forms of surface water disposal have been considered. These included infiltration techniques and the use of storage ponds.

Prior to a desk top geo-environmental study being carried out, we viewed the 1:250,000 Soil Map of England and Wales which describes the soils in the area of the site as the Bardsey series, a slowly permeable seasonally waterlogged loamy over clayey and fine silty soils over soft rock. The tenant farmer confirmed that the soils are only slowly permeable. It is therefore unlikely that infiltration techniques will be appropriate in disposal of surface water from the development. The Geo-Environmental study has confirmed that the underlying soils are likely to be cohesive and therefore unsuitable for infiltration drainage techniques.

The use of open storage ponds to form part of the surface water discharge attenuation system is a possibility. However, their future maintenance would need to be considered. Yorkshire Water would consider adoption as part of the public sewer system but they would not allow any flow of ground water into the storage ponds. They also require a number of onerous conditions to be met. The ponds would be likely therefore to be dry/wet ponds which would drain after a storm event. It is likely that the ponds would attract fly tipping and would be difficult to maintain. The ponds could be submitted to Barnsley MBC for adoption and future maintenance but for the reasons given above, the Barnsley MBC Drainage Engineer has stated that it is unlikely that the Council would agree to adopt storage ponds for future maintenance.

Outline calculations have been carried out on the surface water discharge from the site.

The flow restrictions have been calculated using the requirements of Barnsley MBC:

- Existing Reema site – 1 in 1 year peak flow, based on a total area of 6.1ha and an impermeability factor of 30%, of 244l/s reduced by 20% to 195l/s.
- Existing agricultural land – at 4l/s/ha – phase 1 3.24ha at 4l/s/ha = 13l/s
- Existing agricultural land – at 4l/s/ha – phase 2 10.15ha at 4l/s/ha = 41l/s

The storage requirements have been calculated using Microdrainage Windes software based on the above, an assumed 40% impermeability for the new development and design rainfall increased by 20% to allow for future climate change. The results were as follows:-

Table 3-1: Approximate Storage Volumes Required

	1 in 30 year Volume m^3	1 in 100 year Volume m^3
Phase 1	580	870
Phase 2	1255	1764

It will be necessary to provide the 1 in 30 year storage volume underground for each phase. To give an indication of the approximate storage facility, the following table gives the equivalent lengths of various pipe diameters:-

Table 3-2: Equivalent Pipe Lengths to Contain Storage Volumes

Storage Volume m^3	1.2m dia. pipe	1.5m dia. pipe	1.8m dia. pipe
$580m^3$	513m	328m	228m
$1255m^3$	1110m	710m	493m

The outfall from both phases should be at the point where the culverted watercourse leaves the site on the western boundary. The underground storage can be distributed within each phase and located to ensure the pipe full capacity can be used without overflow in the 1 in 30 year storm event.

Detailed design will be undertaken based on the proposed road and housing layout. The storage volumes and storage pipe diameters will be finalised at that stage.

3.2 Foul Sewerage

It is proposed that foul sewers be designed according to Sewers for Adoption published by the Water Authorities Association. Sewers should be laid within public highways and public open spaces.

3.3 Watercourse

It will be necessary to replace the existing pipeline on the line of the watercourse across the northern part of the development. The replacement pipeline will be designed to accommodate flows in the watercourse below ground and will be of a greater diameter than the existing pipeline.

4 ADOPTION AND MAINTENANCE ISSUES

4.1 Sewers

Foul and surface water sewers will be designed and constructed according to Sewers for Adoption and agreements will be entered into with Yorkshire Water for adoption as public sewers. This will include the underground storage and flow attenuation features.

Discharge of surface water from the site into the watercourse and the Culverting of the existing watercourse through the site will require the consent of Barnsley MBC as Land Drainage Authority under land drainage legislation.

4.2 Watercourse

The watercourse is the responsibility of the riparian land owners. In this case, the whole of the watercourse across the site lies within the ownership of Barnsley MBC as owner of the land. The proposed replacement pipeline on the line of the watercourse will be designed to the requirements of Barnsley MBC. The Council will be responsible for maintaining the new pipeline.

It will be preferable for the line of the watercourse and a maintenance and access strip of at least 10m be kept clear of houses and gardens and that there is no tree planting within that strip. This is in order that access can be gained to the watercourse for maintenance and replacement.

This page is intentionally left blank.

5 OUTLINE ENVIRONMENTAL APPRAISAL

5.1 Introduction

An ecological survey was carried out on the receiving watercourse to assess the environmental impacts of discharge of surface water from the development to this watercourse.

5.2 Watercourse Description

The receiving watercourse is culverted from the edge of the site to Common Road. Here the watercourse has a mean channel width of 1m at water level with banks ranging from 0.5m to 1.5m in height and at an angle of approximately 45°. The substrate is predominantly silt/mud. The flow was slow.

Rough grasses and tall ruderals dominate the banks with hawthorn, bramble and several ash trees along the left bank. Very few wetland species are present within the watercourse.

5.3 Water Vole Survey

A water vole survey was undertaken in accordance with the methodology described by R Strachan in *Water Vole Conservation Handbook* published by English Nature over the entire length of the watercourse. The survey found no evidence of water vole activity in the watercourse.

5.4 Other Protected Species

No other protected species were recorded in or adjacent to the watercourse during the ecological survey.

5.5 Vegetation Survey

A survey of aquatic and wetland flora was undertaken using a modified version of the standard method for the survey of ditch vegetation developed by Alcock & Palmer in their publication *A Standard Method for the Survey of Ditch Vegetation* (NCC 1985). Very few aquatic plant species are present with just small patches of Water-cress (*Rorippa nasturtium-aquaticum*) and Common Water-starwort (*Callitriche stagnalis*) in the more open areas of the channel.

Grassland communities typical of neglected urban sites and ruderals dominate the banks with hawthorn and several ash trees evident along the left bank.

5.6 The Wider Site

A walkover survey of the whole site to be developed found very little of ecological interest. The site consists of an existing area of housing and two arable fields. There are three small watercourses present on the site. Two which run either side of a public footpath and one that runs behind existing housing along the boundary of the arable field. These watercourses are shallow drains, with banks less than 0.5m in height and are dominated by rough grasses and litter. The channels are largely dry but where water is present Common Duckweed (*Lemna minor*) is frequent.

No other open water bodies were found to be present.

5.7 Conclusions of Ecological Survey

We conclude from the ecological survey that discharge of surface water from the development to the watercourse will not impact upon any protected habitats or species and is unlikely to have a significant environmental impact.

This page is intentionally left blank.

6 PUBLIC UTILITY SERVICE PROVIDERS

6.1 Public Utilities Contacted

The following Utilities have been contacted:-

- Yorkshire Water – Water Supply
- Yorkshire Water – Sewerage
- Yorkshire Water – Sewage Treatment
- Transco National Grid – Gas Supply
- YEDL – Electricity Supply

6.2 Yorkshire Water – Water Supply

Yorkshire Water has confirmed that they are able to supply water to the development.

An existing 6" main crosses the site connecting Thurnscoe East with the Merrill Road area. This will need to be maintained within the new development and diverted within the development road system as far as possible at the developer's expense.

A new water main to supply the development approximately 1000m long will be required connecting into the existing 12" main in Clayton Lane, again at the developer's expense.

6.3 Yorkshire Water – Sewerage

The responses regarding sewerage and sewage treatment have been described above.

Foul sewage may be discharged to the existing 225mm diameter public combined sewer in Oak Road and Yorkshire Water considers that surface water could drain to the existing watercourse across the site.

Discussions with the Planning Manager for sewage treatment revealed that the existing Bolton Waste Water Treatment Works does not have sufficient capacity to accommodate the proposed development. Improvements will be required and it may be that planned upgrades would be brought forward to reduce the requirement for additional land take at the works. Further discussions with Yorkshire Water will be necessary to determine the increase in flow which will trigger the requirement for the additional capacity, how that additional capacity will be provided, how it will be financed and what contribution towards the cost will be required from the developer.

6.4 Transco National Grid – Gas Supply

National Grid has provided an outline proposal for gas supply to the development. They have stated that due to the size of the development, it will be necessary to carry out a design study for the project but they have not raised any supply problems at this stage.

6.5 YEDL – Electricity Supply

The proposal to supply the development will include diversion of an 11kV overhead line through the site to feed 2 No 100kVA Unit Distribution Equipment installations. Apart from the cost of this, YEDL has not identified any supply problems at this stage.

This page is intentionally left blank.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Flood Risk Assessment

On the basis that on site drainage systems are designed to the criteria described in this report, the risk of flooding to properties within the development will be low.

7.2 Drainage Impact Assessment

The impact of the development on surface water drainage systems downstream will be low providing the design criteria described in this report are used.

The development will have a significant impact on the Bolton Waste Water Treatment Works and it is recommended that discussions take place with Yorkshire Water to agree a programme of capacity improvements.

7.3 Drainage Systems

A drainage survey should be carried out on the existing development to establish the impermeable area currently draining to the watercourse.

A site investigation should be carried out to confirm the unsuitability or otherwise of the subsoil to accept infiltration drainage.

Surface water and foul sewers are to be designed to Sewers for Adoption published by the Water Authorities Association for adoption by Yorkshire Water.

The storm water attenuation storage and flow control are to be designed to the requirements of Barnsley MBC regarding the discharge to the watercourse and to the requirements of Yorkshire Water for adoption as part of the public sewer system.

The existing piped watercourse should be replaced with a larger pipe diameter, to be designed to adequately carry the estimated peak flow from the natural catchment across the site. The pipeline should be constructed to the requirements of Barnsley MBC who will become responsible for its maintenance as riparian land owner.

More detailed design of the proposed drainage systems including the flow attenuation will need to be carried out based on an outline development layout. This will help to identify the most suitable locations for the storage pipes and flow control chambers.

Consideration should be given to carrying out hydrological modelling of the watercourse down to the southern edge of Thurnscoe in order to establish if there is any spare capacity which would allow an increase in discharge rate from the development and reduction in the storage volumes.

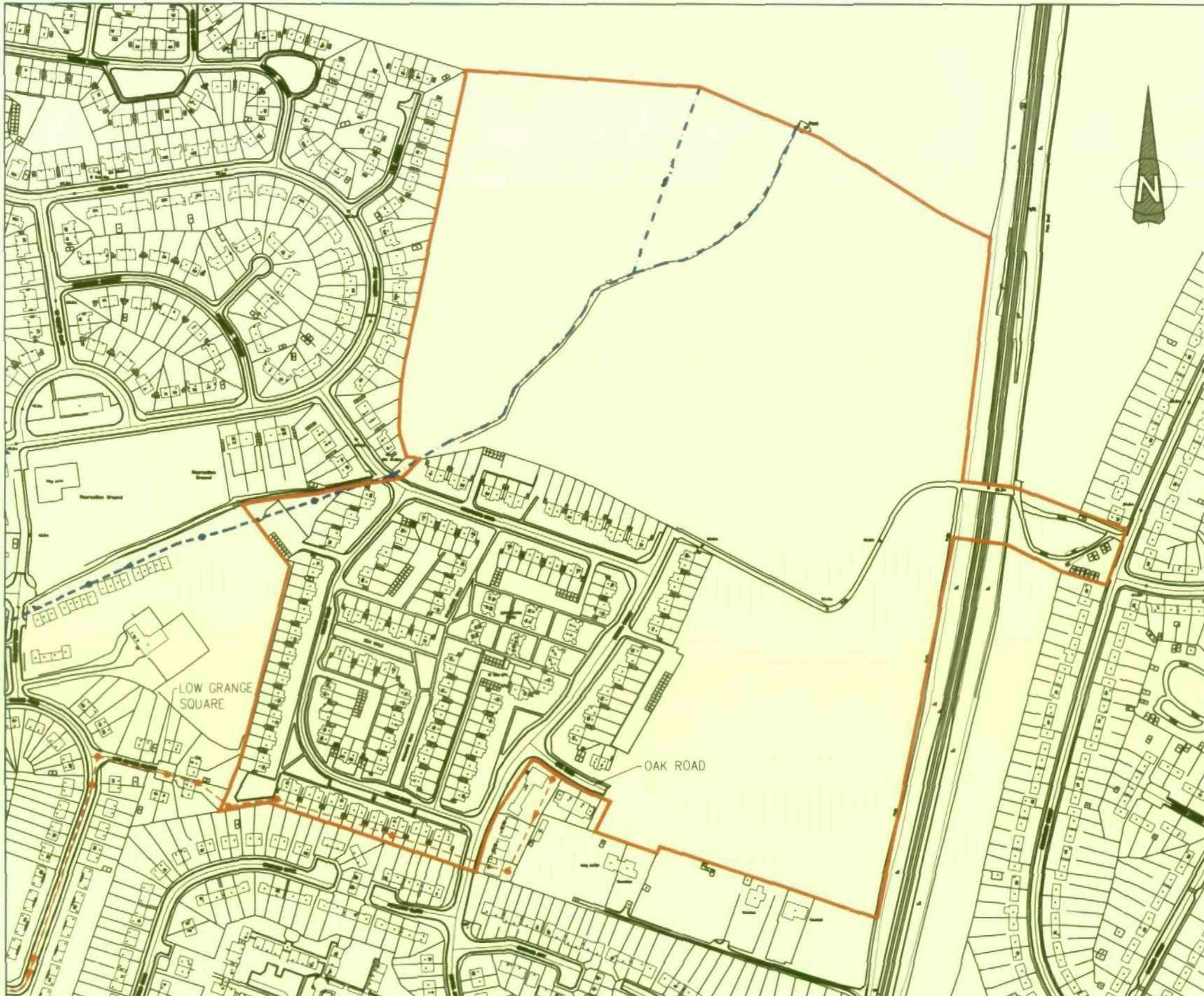
This page is intentionally left blank.

APPENDICES

This page is intentionally left blank.

Appendix A - Location Plan

This page is intentionally left blank.



NOTES:

KEY:

- DEVELOPMENT AREA
- CULVERTED WATERCOURSE
- WATERCOURSE PIPED BY FARMER (APPROXIMATE)
- PUBLIC FOUL SEWER (OTHER SEWERS SERVING ESTATE NOT SHOWN)

REV	MODIFICATIONS	DRAWN	CHK	APP	DATE
A	PRELIMINARY	TJ	GH	RB	11.07.06

jba

— for —

CHEVIN HOUSING ASSOCIATION LTD.

REEMA ESTATE & ADJACENT LAND THURNSCOE

LOCATION PLAN - APPENDIX 'A'

Scale		
1:2500 @ A3	Drawn	T.Jackson - 28.06.06
	Designed	C.D.Wright - 28.06.06
	Checked	G.Heald - 11.07.06
	Approved	R.Buck - 11.07.06

Drawing Number	Sheet No.	Status
2006s1763-02a	1 of 1	FINAL