Buccleuch Academy, Kettering

Flood Risk Assessment
Buccleuch Academy, Kettering

Flood Risk Assessment

Contents Amendments Record

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1 Executive Summary

The Montagu School in northern Kettering is proposed for redevelopment to provide new buildings and ancillary facilities to form the Buccleuch Academy with associated new car-parking, delivery areas and all-weather pitches. The new Academy will occupy land currently used as playing fields. The main school buildings will be demolished and a new all-weather playing area created, though some existing buildings will be retained.

The school site lies wholly within Flood Zone 1. There is no material flood risk from fluvial flooding affecting the site or the new buildings. Similarly, neither off-site sewer flooding, groundwater nor surface-flooding are considered to pose material flood risks to the scheme. No instances of water ingress to any buildings or of any prolonged external ponding have been reported.

Ground conditions on the site are suitable for disposal of surface water via soakaways. The drainage strategy for the scheme will utilise SuDS applications based around attenuation and soakaway techniques.

The proposed development drainage will comprise permeable paving, attenuation basins, swales or sub-surface storage features and piped networks to collect and convey run-off from the new scheme (access road, parking and buildings). Following attenuation, flows will be discharged to a series of existing and new soakaways around the site. New soakaway features will use boreholes to reach the permeable strata beneath the site.

The proposed surface water drainage network will provide sufficient capacity on site to store excess run-off up to and including the 1 in 100-year + 20% rainfall event, in line with Environment Agency requirements. The site layout and peripheral landscaping will be designed to prevent any excess run-off in storms that exceeds the drainage capacity from flooding into the buildings or to neighbouring properties.

The proposed drainage system provides two or three-tier ‘treatment trains’ of SuDS features to the car-park areas. A one-tier sequence is provided for the cleaner roof run-off prior to discharge to the soakaways.

The proposed scheme is considered to be at no material risk of external flooding and the scheme will include sufficient drainage measures to manage the on-site risk of flooding to the required standards in line with PPS25 Development & Flood Risk.
2 Introduction and Existing Site

Introduction

2.1 JMP has been commissioned by Willmott Dixon Construction Ltd to undertake a Flood Risk Assessment (FRA) to support the detailed planning application for the proposed re-development of the existing Montagu School, Kettering. The new school will be called Buccleuch Academy.

2.2 The proposed site of the Academy which is to undergo re-development covers approximately 3ha and lies within Flood Zone 1. A formal FRA has therefore been required due to the site size and has been undertaken in accordance with PPS25 Development and Flood Risk\(^1\). This supersedes an earlier FRA\(^2\) prepared in support of the outline planning application earlier in 2010 by Mott MacDonald but refers where appropriate to information recorded in that document.

Existing site location and layout

2.3 The new Academy’s proposed site occupies the central and eastern parts of the Montagu School campus which is located off Weekley Glebe Road north east of Kettering town centre. The site is bounded by housing off this road to the south, by houses off Kipling Road to the west, by allotment gardens to the north and by farmland to the east. The site location (development outline shown red) is shown in Figure 2.1 below. A more-detailed current site layout is shown on JMP drawing nr MID1132/KET/SK01, included in Appendix A.

Figure 2.1 Site Location

Source: Ordnance Survey Map with the sanction of the Controller of Her Majesty’s Stationery Office. Crown Copyright reserved.
A series of photographs of the site and its surroundings are included in Appendix B.

The campus falls from north-west to south-east with a level difference of approximately 13m across the site itself. There is a pedestrian entrance to the school off Weekley Glebe Road and the main vehicle access, a short distance to the east, also provides access to the playing fields. The main school buildings and car-parking areas are within the centre of the site. Playing fields are located to the west and to the east of the existing buildings. A topographic survey of the site is included as JMP drawings nr MID1132/KET/SK03 & 04 in Appendix A for information.

Ground Conditions

A site investigation [(3)] at the existing school site was undertaken in 2009 by Geotechnics Ltd. A summary of this report, contained in a subsequent report dated October 2010, has been made available to JMP for use in this FRA. Borehole results identified made ground with an average depth of 2m (maximum depth of 8.5m) at all borehole locations. The made ground, in the majority of test sites, was underlain by the Upper Estuarine Series in the form of a sandy gravelly clay. It was noted that, in some samples, this clay was of a fissured nature. Extracts from the borehole logs are included in Appendix C.

Geotechnics also undertook a groundwater survey in 2009 comprising window excavations and borehole tests across the site. Locations of these points are shown on a plan in Appendix C. Groundwater was only found at one location (WS5). This may indicate a local perched water table. However, due to the presence of two soakaways nearby (within 20m), it is possible that the water encountered at WS5 originated from those features as the ground in this vicinity was predominantly weathered clay.

During January 2010 further infiltration tests were made on an existing soakaway located at the existing carpark south-east of the sports hall. Groundwater was recorded at a depth of 5m below ground level with very high infiltration rates.

Further investigation in October 2010 encountered groundwater only once in borehole RO1, located close to the access road south-east of the sports hall and in the vicinity of an existing soakaway. Standpipes installed in boreholes BH4, BH6, R01 and R03 identified groundwater at depths of between 4.5 - 15m below ground level.

Soakaway tests were conducted in boreholes R01 and RO2. In borehole R01, despite a large amount of water being pumped into the borehole it was not possible to raise the water level. It was estimated that the discharge rate at borehole R01 was 111 l/m²/min (in accordance with BRE Digest 363). In borehole R02 the discharge rate was calculated at 0.5 l/m²/min.

The Geotechnics GI report (dated October 2010) made reference to a former Ironstone Quarry within the western boundary of the site which can be seen on historical maps of the area. This quarry was backfilled, reportedly between 1968 and 1973 with material including household waste. The exact extent of this feature and the fill was not identified but its position on the western edge of the site in comparison with the new scheme’s location further to the east means that this feature is highly unlikely to influence the new drainage arrangements.
Existing water features

Drainage

2.12 The existing school buildings and peripheral areas are served by a surface water drainage network which drains to soakaways located around the site. The sports fields incorporate land drains which reportedly drain off-site to the east. The sports pavilion is connected to a public surface water sewer in Weekley Glebe Road via piped underground drainage which crosses private property.

2.13 The current drainage layout is shown on CTM drawing 10-348-P501 in Appendix A. Sewer records for the area from Anglian Water are also included.

Groundwater

2.14 According to the indicative mapping available on the Environment Agency (EA) website, the proposed development site is not located within or close to any Groundwater Source Protection Zones: there are none in the local region. The 2009 FRA\(^2\) showed that the local aquifer pattern is complex, comprising a mix of principal, secondary (A, B and undifferentiated) zones. These were only recorded in the bedrock level – no aquifers were classed at the superficial deposit levels.

Figure 2.2 Groundwater aquifers – bedrock

2.15 As stated in the report\(^3\), the potential for soakaways at the site depends on the interconnectedness of the underlying minor and major aquifers which may vary greatly over relatively short distances.

Open Water Features

2.16 The River Ise, the location of which can be seen on Figure 2.3, is located approximately 700m beyond the eastern campus boundary. There are no other water bodies within or close to the campus.

2.17 Springs are recorded on the OS mapping east of the Stamford Road (the A4300) towards Weekley and there is a property entitled ‘Well Cottage’ close by, which suggests that the ground downhill from the site is less permeable and causing groundwater to emanate from the ground in that vicinity. In turn, it also suggests that the higher ground including that on which the Montagu School sits is more freely drained and able to infiltrate.
Current flooding conditions

2.18 The EA’s indicative flood-mapping on their website shows the site to lie well within Flood Zone 1: the nearest instance of Zones 2 or 3 is associated with the River Ise, which is some 30m lower than the eastern margins of the Academy site. Groundwater flooding has not been recorded at the site.

**Figure 2.3 Indicative flood map**

Environment Agency website, 2010

2.19 There are currently no known issues with the current site drainage. The outline FRA(2) for the site recorded that the site had not experienced any fluvial, groundwater, or sewer flooding.

2.20 The topography of the site is such that during an extreme event should the on-site drainage become overwhelmed then the excess waters will flow across the site from west to east. Any entrances with low thresholds on the uphill faces of buildings could be at risk of water ingress in such conditions though no report of any such occurrence has been made.
3 Regulatory Requirements

Environment Agency

3.1 A FRA\(^{(2)}\) for the site had previously been undertaken for outline planning by Mott MacDonald. This included information provided by the EA with regards to detailed flood information for the site. The EA has confirmed that their advice provided to Mott MacDonald has not changed and is still relevant to the site. Their observations on the final version of the outline-planning stage assessment from May 2010 are included in Appendix D and chiefly focussed on drainage management issues.

Planning Authority Requirements

3.2 The Strategic Flood Risk Assessment\(^{(4)}\) for the area does not detail any specific requirements that are to be considered in this FRA for this particular site. The SFRA has considered fluvial flood risk only. It did not consider the risk of flooding from sewers, surface water and overland flooding or failure of water retention facilities. The SFRA states that there are no known records of major flooding issues in the Borough from storm water drainage systems.

3.3 Kettering Borough Council makes reference in its Planning website to the North Northamptonshire JPU Sustainability Design SPD\(^{(5)}\) which includes consideration of flood-risk and drainage management, though not in explicit terms. The aims of this document though have been addressed through the flood-risk management and drainage-management steps taken for this scheme.

Anglian Water

3.4 Anglian Water has surface water sewers in the vicinity of the schools though none of these enter or cross the proposed development site. It is proposed that, with the exception of an area of road surface near the existing Sports Pavilion, surface water from the site will not be discharged into the existing sewerage network. A copy of Anglian Water’s drainage record for the vicinity is included in Appendix A.

3.5 Anglian Water will not be adopting the proposed drainage within the Academy and, with the possible exception of an area of road near the existing Sports Pavilion, the new surface drainage will not be connected to the public sewer network. Anglian Water is therefore unlikely to have any specific requirements for the site.

3.6 In the event that any surface drainage from the new scheme is connected to the public sewer network, any shared lengths with other parties (e.g. the LEA as owners of the primary school) will be adopted and the standards of Sewers for Adoption\(^{(6)}\) will apply.
4 Development Proposals

Development Details

4.1 The re-development site covers approximately 3ha and comprises the existing Montagu School buildings and playing fields to the east and west. It is proposed that the site will be re-developed to provide:

- New Academy buildings with a floor-area of approximately 12,900m$^2$ to be sited on part of Weekley Glebe Playing Fields east of the existing school buildings.
- A new sports pavilion constructed on the location of an existing teaching block. The existing sports pavilion serving the playing fields is to be removed.
- A new all-weather sports pitch and a Multi-Use Games Area (MUGA) on the site of the redundant school buildings.
- Associated amenity space, car parking, and servicing arrangements and landscaping.

4.2 The existing sports hall will be retained. The proposed layout is shown on JMP drawing nr MID1132/KET/SK02 included in Appendix A.

4.3 The main vehicular access to the site will not change as a result of the redevelopment and access from Weekly Glebe Road will be maintained. Removal of the existing pavilion building will remove a small area currently drained to the local sewer network, though no more than 600m$^2$.

4.4 The total area of the site to be redeveloped is approximately 11.7ha. However, of this only 1.7ha is proposed as new development, comprising buildings and hardstanding areas, on an adjacent area of existing playing field. The existing English Block and Sports Hall will be retained, whilst the main school building will be demolished to make way for a sports pitch. The existing MUGAs will be retained and existing car-parking will be retained / extended.

4.5 The existing ‘hard surface area’ covers 2.9ha. As a result of the development, 1.4ha of this area will remain. The new artificial pitch will cover 0.7ha and the new MUGA will occupy 0.37ha. The new school building and adjacent paving covers approximately 1.0ha. There is therefore an overall increase in the net drained area.

4.6 Surface water run-off from buildings and new or retained surfaces around the new Academy will be directed towards a number of existing or new drainage features. These include five existing soakaways to the west of the proposed new Academy building, new swales, attenuation and infiltration features. The detailed drainage strategy is described in Section 5.

Sequential Test

4.7 The new building location lies within Flood Zone 1. The objective of the Sequential Test under PPS25$^{(1)}$ is to direct new development to the least flood-prone areas. As such, the proposed development meets this objective and passes the Test. No further assessment in this respect is needed.
5 Assessment

Flood Risk

Watercourse

5.1 The proposed Academy building site lies within Flood Zone 1 as shown on the EA’s indicative flood mapping. The nearest watercourse, located approximately 0.7 km from the eastern boundary of the site, is the River Ise. The Academy site is located at an elevation 30m above the river and there are no recorded watercourse flood events at the site. This is not a material risk to this scheme.

Sewers

5.2 Records from Anglian Water show public sewers under the roads surrounding the site but none within the site. Drains within the site are shown on CTM drawing 10-348-P501 Rev B included in Appendix E.

5.3 There are no reported instances of sewer flooding on Weekley Glebe Road. Flooding from public sewers adjacent to the site will not encroach upon the Academy as any such incidence would be contained on the roads on which it occurred.

5.4 Flooding from existing drainage within the site may pose a risk in very heavy rainfall but the new layout will be designed to manage this risk and prevent damage to property or harm to persons. This is specifically addressed later in this Section.

Surface Water Run-off

5.5 In an extreme storm, it is possible for local drainage to be overwhelmed by the sheer intensity of rain and for excess flows to travel on the surface (in addition to excess water from overflowing drainage). The area uphill of the site consists of low-density housing or allotments and is not considered to pose any material threat to the site. Existing paved areas within the site are of limited scale and some will be removed as part of the proposed scheme. It is therefore concluded that excess surface water originating from land beyond the site poses no material risk to the site.

5.6 Calculations by others suggested that the existing on-site drainage system’s capacity would be exceeded at rainfall events of a 30-year return period (which corresponds to the Sewers for Adoption design standard for new public sewers). However, no past flooding at the site is reported and this level of performance would not be unreasonable for on-site drainage (as distinct from public sewers).

Groundwater

5.7 According to indicative mapping on the EA website, the proposed development is not located close to any Groundwater Source Protection Zones. The site lies above a complex mix of secondary and principal aquifers and is underlain by made ground up to an average depth of 2m. This made ground in turn is underlain by the Upper Estuarine Series in the form of sandy gravelly clay. The school’s present drainage relies on a number of soakaway features, indicating that the underlying soil is reasonably permeable.

5.8 During recent site investigations groundwater was encountered at one location which, at the time, was considered to be indicative of a localised perched water table. Further tests identified groundwater at four locations across the campus at depths ranging from 4.5 to 15m below ground level. Groundwater is not considered to be a material source of flood-risk to the site.
Existing flood-risk: summary

5.9 The proposed Academy site is considered to be at no material risk of flooding from fluvial, groundwater, sewer or surface flooding.

Surface Water Drainage Strategy

Existing site surface drainage

5.10 The existing paved/roofed areas are served by both soakaways and existing surface water drainage networks. Existing soakaways are located within the vicinity of the English Block, to the south of the Humanities Block, and to the east and west of the Sports Hall (see JMP drawing nr MID1132/KET/SK01 in Appendix A). All drains discharge to existing soakaways within the school site.

5.11 The playing field to the western side of the school site drains via land drains to existing soakaways within the site boundary. The playing fields to the east of the existing school site drain via surface water pipes towards the south-east corner of the site: their outfall is unknown though at the south-eastern corner of the school site a single surface water pipe is recorded to exit the site towards Weekley Glebe Road and is presumed to connect with the general surface-water sewerage.

Proposed drainage strategy and SuDS selection

5.12 As described earlier, the ground conditions on the site are considered to be suitable for the use of infiltration as a drainage approach. Soakaway tests identified high permeability at a number of borehole locations as noted in Section 2.

5.13 According to Table 5.1 of CIRIA manual C697\(^{(7)}\), the development is classed as ‘commercial’. Table 5.2 of the manual indicates that all types of SuDS technique are considered appropriate for this type of development. Table 5.4 lists suitable SuDS techniques as being:-

- Retention ponds;
- Sub-surface storage;
- Wetland features (within limits of site slope);
- Swales (likewise)
- Green roofs;
- Permeable pavements.

5.14 Rainwater harvesting, whilst appropriate to the scheme’s nature, would not be considered as part of the surface-water drainage solution since it cannot be relied upon in the design event. This particular application has not therefore been considered under this FRA.

5.15 Green roofs for the main building have been considered but rejected in this instance on the grounds of cost-effectiveness, given the availability of alternative SuDS applications. The extra cost of such features was estimated to add up to £0.5m to an overall project cost of over £24m.

5.16 The scheme’s proposed drainage layout is shown on CTM drawing 10-348-P501 in Appendix E and includes the following networks for specific areas or features:-

- Existing impervious areas in the central and western parts of the site that are retained will continue to drain to existing soakaways as they do at present.
- An existing borehole soakaway to the south-east side of the Sports Hall car-park will be retained and possibly extended. At the time of writing this report a decision to extend the soakaway was pending and will depend upon the results of further tests being undertaken n
the near future. The car-park adjacent to the Sports Hall will be extended using permeable pavements with an open-graded sub-base to provide attenuation of the run-off. The pavement-construction will be lined with a geo-membrane to contain water within the sub-base and the whole will discharge to soakaway.

- Hardstanding areas directly adjacent to the western edge of the new Academy building will also be surfaced with permeable paving with a thinner sub-base. These paved areas, and roof water from the new main building, will drain to three cellular storage features. Each storage feature will have a capacity of 19m$^3$ and will discharge to two new borehole soakaways.

- Permeable paving to the north, east, and south of the proposed Academy building will drain to an attenuation pond with a capacity of over 300m$^3$. This pond will in turn discharge its attenuated outflow to three new borehole soakaways.

- A new car-park to the west of the new main school building will drain to a swale as will hard-standing areas in the vicinity of the existing English Block, which discharges to a cellular storage feature with a capacity of 60m$^3$. This will then drain to two new borehole soakaways. A surface storage basin is to be located just to the west of the swale; along the eastern boundary of the southernmost existing MUGA.

- A fourth cellular storage feature will be located to the north of the proposed new main school building, serving run-off from a new access road/path north of the building. This will have a storage capacity of less than 20m$^3$ and will drain to two new borehole soakaways.

- New sports facilities will be constructed on the site of the current school buildings, including an all weather pitch and a new MUGA. These facilities will include permeable surfaces with attenuation in the sub-base and will drain to an existing soakaway near the western boundary of the school site.

- The modified access road will drain to a new sub-surface storage feature with a capacity of 50m$^3$ which will discharge to two new borehole soakaways.

5.17 A series of assessments of the storage volumes needed pending infiltration to the borehole soakaways has been made and output from the drainage-modelling for each system is included in Appendix E. The borehole inflow rates are, based on a nominal 150mm diameter, estimated between 0.3-18l/s. Further site investigation is planned within the month to provide additional information and the capacities of individual systems will be reviewed in the light of that data prior to finalisation of detailed design.

5.18 The proposed drainage system will provide a two-tier treatment train of SuDS features to the car parking area adjacent to the Sports Hall. Surface water will drain via permeable paving to an existing soakaway.

5.19 The proposed drainage system will provide a two-tier treatment train of SuDS features for the main parking area to the west of the proposed new main school building. Surface water will initially be directed towards a swale which will then drain to a cellular storage tank. Any contaminants will be trapped within the swale or settle in the cellular storage before draining to a borehole soakaway.

5.20 A one-tier sequence is provided for the cleaner roof run-off (cellular storage attenuation feature) which is considered sufficient for onward discharge to borehole soakaway due to the much lower risk of pollution from such areas.

5.21 The proposed drainage system to the east of the site, in the vicinity of the proposed main school building, will be composed of a three-tier drainage system. Surface water will be attenuated by permeable paving that first drains to an attenuation pond, and then to borehole soakaways in the south-eastern corner of the development site.
5.22 The proposed new all-weather pitch, to be located on the site of the current school buildings, will drain towards its south-western corner where a storm water drain will convey run-off to a soakaway within the western boundary of the school site.

5.23 Details of previous correspondence between the drainage designers and the EA concerning water-quality are included in Appendix D for information.

5.24 The surface water drainage network that will serve the proposed re-development will be designed to accommodate surface water run-off from the site up to and including the 1 in 100-year + 20% rainfall event (design storm), as described later. This will control the rate at which water is discharged into the underlying aquifer(s) beneath the site and thereby limit any adverse effects upon springs to the east associated with these strata.

5.25 However the new drainage will not necessarily cope with excess surface run-off from storms in excess of the appropriate design standards. The site layout and building entrances will be designed to divert overland flows away from entrances or other potential inlets into the building and instead encourage such flows to pass harmlessly towards less sensitive areas such as car parking and soft landscaped areas. Ground profiling is also proposed to direct surface flow, resulting from extreme events, towards the footway access at the southern site boundary, a path that leads onto Weekley Glebe Road. Any water that reaches the road will be conveyed along the carriageway as it runs along the contours of the hill.

5.26 A plan showing the behaviour of excess waters once the design standard of the new drainage has been exceeded is included in Appendix E (CTM drawing nr 10-319-540) to demonstrate how this will be accomplished.

Future maintenance arrangements

5.27 The drainage systems for the development will remain under private ownership with the education authority/Academy owner, as will responsibility for future maintenance. No formal adoption of any drainage features by AW or any other body is proposed.

Residual Risks

5.28 The only residual risk considered to apply to the proposed scheme is that of surface flooding in extreme conditions. The flow-exceedence plan (see above) shows that, under extreme conditions, water will be directed away from the new Academy buildings. This therefore removes the risk of surface-water entering the new building.

5.29 To the south side of the site, any excess water will be directed towards the access road to the school, whilst to the west and east water will be directed towards the school playing fields. Provision will be made in the landscaping works to control the risk of excess run-off spilling over the southern boundary of the site and down-slope to the rear gardens of the neighbouring housing.

5.30 There are considered to be no significant residual risks to the scheme from fluvial, groundwater, sewer or surface flooding.
6 Conclusions

6.1 The Montagu School in northern Kettering is proposed for redevelopment to provide new buildings and ancillary facilities to form the Buccleuch Academy. This will create a new building with associated new car-parking, delivery areas and all-weather pitches. The new Academy will occupy land currently used as playing fields. The main school buildings will be demolished and a new all-weather playing area created, though some existing buildings will be retained.

6.2 The school site lies wholly within Flood Zone 1. There is no material flood risk from fluvial flooding affecting the site or the new buildings.

6.3 Neither off-site sewer flooding, groundwater nor surface-flooding are considered to pose material flood risks to the scheme. No instances of water ingress to any buildings have been reported or of any prolonged external ponding.

6.4 Ground conditions on the site are suitable for disposal of surface water via soakaways. The drainage strategy for the scheme will utilise SuDS applications based around attenuation and soakaway techniques.

6.5 The proposed development drainage will comprise permeable paving, attenuation basins, swales or sub-surface storage features and piped networks to collect and convey run-off from the new scheme (access road, parking and buildings). Following attenuation, flows will be discharged to a series of existing and new soakaways around the site. New soakaway features will use boreholes to reach the permeable strata beneath the site. Detailed design of these features will be completed once outstanding site investigations are completed.

6.6 The proposed surface water drainage network will provide sufficient capacity on site to store excess run-off up to and including the 1 in 100-year + 20% rainfall event, in line with EA requirements. The site layout and peripheral landscaping will be designed to prevent any excess run-off in storms that exceeds the drainage capacities from flooding into the buildings.

6.7 The proposed drainage system provides two or three-tier ‘treatment trains’ of SuDS features to the car-park areas (the higher-risk source of pollution). A one-tier sequence is provided for the cleaner roof run-off. The general approach has previously been agreed with the EA.

6.8 The proposed scheme is considered to be at little or no material risk of external flooding and the scheme will include sufficient drainage measures to manage the on-site risk of flooding to the required standards in line with PPS25\(^{(1)}\).
7 References

2. Flood Risk Assessment, Kettering Buccleuch Academy; Mott MacDonald; March 2010.
3. Ground Investigation at Buccleuch Academy Kettering; Geotechnics Ltd; October 2010.
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Appendix A: Contents

JMP drawing nr MID1132/KET/SK01 Site Layout & existing drainage

JMP drawing nr MID1132/KET/SK03, 04 Site survey sheets 1 and 2 of 2

Anglian Water Sewer record

JMP drawing nr MID1132/KET/SK02 Proposed Site Layout
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Appendix B: Contents

Photos 1-10 of site and surroundings.
Appendix C

Site Investigation Information

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Geotechnics drawing ‘Exploratory Hole Location Plan Showing Section Lines’: September 2010.
Borehole Records for BH1, BH3, BH4, BH5, BH6, R03, R01, and R02.
Appendix D

Statutory Authorities Correspondence

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EA letter to Northamptonshire CC 5th May 2010

Emails between CTM & EA, October 2010
## Appendix E

### New Drainage Details

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Appendix E: Contents

CTM Drawing ‘Drainage Layout’ Drawing number 10-348-P501 Rev B

CTM WinDes output for (in order):

- Cellular storage networks nrs 1-5
- Existing roads network
- New roads network
- Attenuation pond network
- All-Weather-Pitch network

CTM drawing ‘Exceedance Flow Plan’ Drawing number 10-348-P510