A REPORT TO ANY TOWN PRIMARY SCHOOL

A feasibility study for the redevelopment of an informal grass area at Any Town Primary School.

22 May 2013

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1 EXECUTIVE SUMMARY ANY TOWN PRIMARY SCHOOL

KEY: **No action required** **Action may be required** **Action required**

Site information

	1.	Any Town Primary School is located in an urban environment and has a small, steeply sloping grassed strip of land which is used for occasional informal recreation. The principal objective of this project is to establish whether this informal area can be developed so that it can support structured PE activity and a summer Sports Day.
	2.	The playing field is located in Flood Zone 1 (low risk); it is not over existing landfill and not located in a Groundwater Source Protection Zone.
	3.	Site geology is the London Clay Formation which is slowly permeable and unsuitable for the installation of soakaway drainage outfall.
	4.	Based on the ADAS 345 method, a drainage scheme should be designed to accommodate a peak drain flow rate of approximately **5.1 L s^{-1} ha^{-1}**.
	5.	The site currently comprises poorly draining CLAY topsoil over deep CLAY subsoil. The results of the soil assessments indicate that soil decompaction will help increase infiltration rates but ultimately a surface bypass drainage system is required.
	6.	The principal site grades have a very substantial fall (11%). Although this will facilitate surface water movement, substantial earthworks (cut and fill) will be required to provide an area which can be utilised as intended.
	7.	Current agronomic condition is poor with the grasses allowed to go to seed and dominated by weed grass species. The existing vegetation should be stripped and reseeded following regrading to improve poor surface levels.
	8.	Assessment of drainage status is not applicable due to the significant slopes identified on site. Should the area be re-graded then land drainage may be required due to the underlying soil characteristics of the site. Although no drainage infrastructure was identified, installation of land drainage would require an efficient outfall. A tributary of a nearby brook could provide sufficient outfall however the capacity of this system should be considered at the drainage design stage, along with necessary discharge consents and planning conditions.

Recommendations

1.	The site is an existing recreation area and currently not suitable for sports use. Substantial re-modelling is required to produce an area which can be utilised as intended. Three alternative options have been considered.
2.	The first option is recommended and comprises the removal of existing vegetation, site remodelling (cut and fill earthworks) and the installation of a retaining wall to maximise the area available for recreational use. This option **(Option 3 in the report)** would also include the installation of a land drainage scheme so that the area can be used all year round. Estimated costs for this preferred option are **£20,769.78 + £2,000.00** for a 12 month maintenance programme to run concurrently with the defects liability period (excluding professional fees and VAT). In addition, it will be necessary to install of some form of pedestrian guardrail to restrict pupils from accessing the recreation area in an unsafe manner. Specialist advice on the most appropriate form and cost of this will be required.
3.	The second option comprises the removal of vegetation, site remodelling comprising a balanced cut and fill operation to construct a plateau bordered by adjacent batter slopes. This option **(Option 1 in the report)** would also include the installation of a land drainage scheme. Available recreation space (m^2) would be slightly less than that for Option 3. Estimated costs for this option are **£13,802.25 + £2,000.00** for a 12 month maintenance programme to run concurrently with the defects liability period (excluding professional fees and VAT).
4.	The final option is for the removal of vegetation, site remodelling and the importation of sub soil to increase the height of areas of low-elevation across the site. The regrading operation will result in the construction of a plateau with one batter slope abutting the existing trees along the northern site boundary. This option **(Option 2 in the report)** would also include the installation of a land drainage scheme. Available recreation space (m^2) would be less than the other options considered. Estimated costs for this development are **£24,976.87 + £2,000.00** for a 12 month maintenance programme to run concurrently with the defects liability period (excluding professional fees and VAT).

- **Recreational pursuits at Any Town Primary School**

Due to the nature of the site the options recommended provide playing areas with approximate dimensions of 60 m x 15 m. Although these dimensions are not ideal with respect to many team participation sports, the development options considered do provide a significant recreation area and will facilitate the enjoyment of many outdoor activities. In particular, the area will support structured PE activities such as ball games (catch, tennis, badminton), football (having goal posts at one or both ends is certainly feasible), cricket and athletics. The recreation area would certainly accommodate a 50 metre straight running track (ideal for primary schools) which could be utilised for events such as Sports Day. The recreation area would also facilitate school fetes and picnics. The earthworks

involved in the development would also ensure that a flat recreation area is created which would provide opportunities for safe sports and play over the current provision.

- **Safety Issues regarding the potential new developments at Any Town Primary School**

The earthworks required to construct a recreational area fit for purpose will involve cut and fill operations. Depending on the option chosen, either batter slopes or a retaining wall will abut the perimeter of the recreation area, maximising available space. All batter slopes constructed will have a shallow gradient of 1:3 which would comply with guidelines stipulated by Sport England for safe use and maintenance.

The construction of a retaining wall, of up to 1.5 m in height, parallel to the existing pathway would require the installation of some form of pedestrian guardrail to restrict pupils from accessing the recreation area in an unsafe manner. Specialist advice on the most appropriate form and cost of this will be required.

Matt Young -– May 2013

2 INTRODUCTION AND OBJECTIVES

TGMS Limited has been commissioned by Any Town Primary School to conduct a detailed site investigation to explore the feasibility of improving the condition of an existing recreation area.

The objectives of the feasibility study are as follows:

- To establish whether a small steeply sloping grassed strip of land, which is currently used for occasional informal recreation, can be developed so that it can support structured PE activity and a summer Sports Day.

- To undertake a detailed site investigation in order to characterise the underlying soil profile.

- To prepare a set of development options for redevelopment of the existing recreation area.

- To derive indicative construction costs for budgetary purposes and present costed options where applicable.

- To provide an indicative work programme for the possible phasing and duration of the proposed construction works. This will also indicate when the recreation area may be available for use.

3 PHYSICAL SITE SURVEY

TGMS conducted a topographic survey of Any Town Primary School playing fields on 22 May 2013. Matt Young of TGMS Ltd conducted a detailed site visit on the 22 May 2013 to identify current issues on site and to evaluate the existing soil characteristics.

3.1 Site location and access

Any Town Primary School
Any Road
Any Town
AB12 3CD

Grid reference;
Eastings 123456
Northings 654321

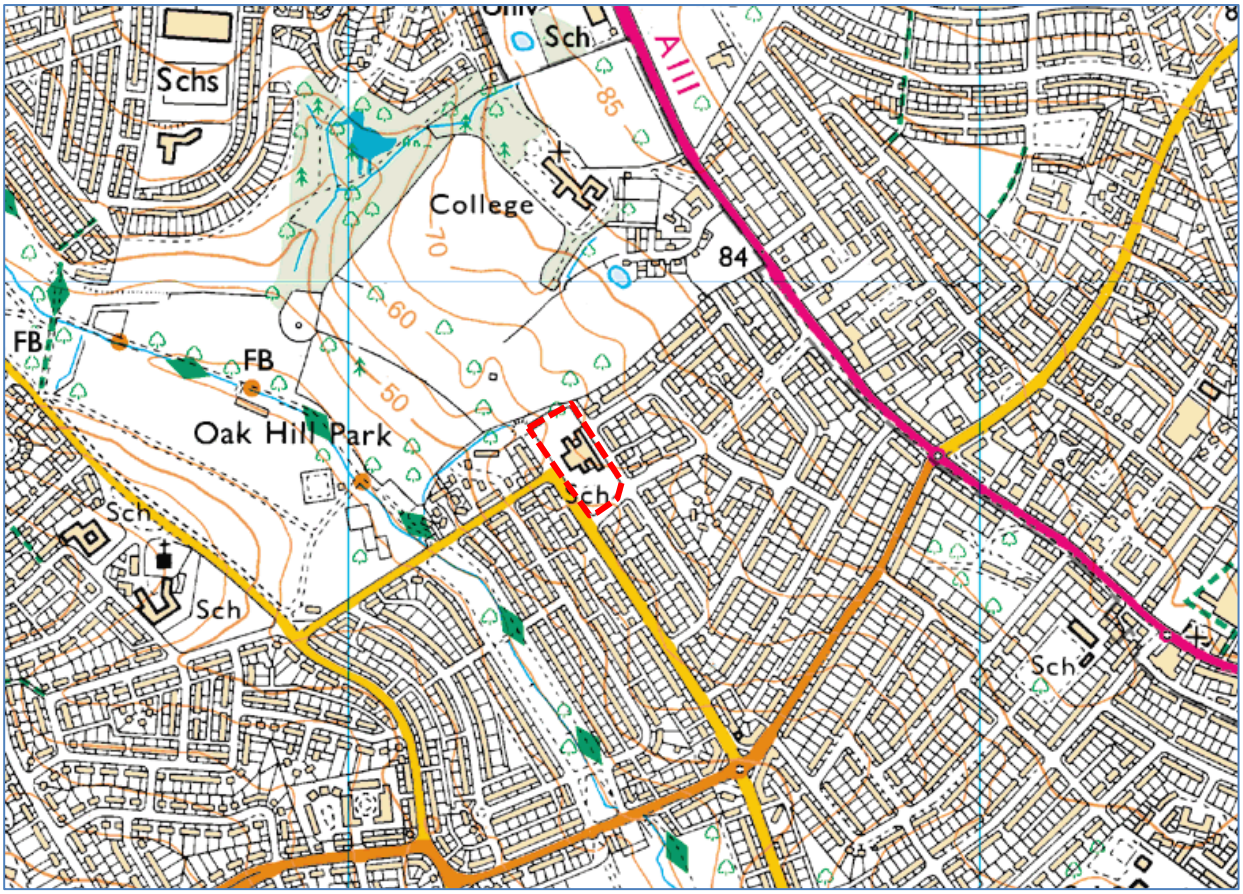

Figure 1 Site location (dashed red line). Locations indicative only and not to scale.

The site currently comprises a small recreation area for informal use by pupils. This is the only outside space available for school use. The site currently has a significant fall from East to West and is therefore unsuitable for most sporting activities. The site is bounded on three sides by residential properties and fields to the north.

Figure 2. General View 1 (GV1) of site looking south-west

Figure 3. General View 2 (GV2) looking north-east.

Figure 4 Any Town Primary School re-development. TP1 and TP2 mark the location of the trial pits. The dashed red line indicates the site development area (indicative only – not to scale). GV1 and GV2 are general views of the site and refer to Figure 2 and Figure 3 respectively. IC1 represents an inspection chamber on site and the blue line represents a watercourse leading to a nearby brook.

3.2 Geomorphology and climate

3.2.1 Hydrology

With respect to climate, data obtained from the Flood Estimation Handbook (FEH) indicate that the standard-period average annual rainfall (SAAR) is 682 mm for this catchment. Based on existing levels (provided by TGMS) and using the methodology for calculating peak flood flow developed by ADAS[1], it is estimated that the peak flood flow rates will be **5.1 L s^{-1} ha^{-1}**.

Based on information obtained from the Environment Agency (EA), the site is located in Flood Zone 1 and at very low risk of flooding from rivers or sea (Figure 5). The site is not located over any former landfill sites or within a Groundwater Source Protection Zone which could restrict the construction of a deep bored soakaway (depending upon geology) as drainage outfall on site.

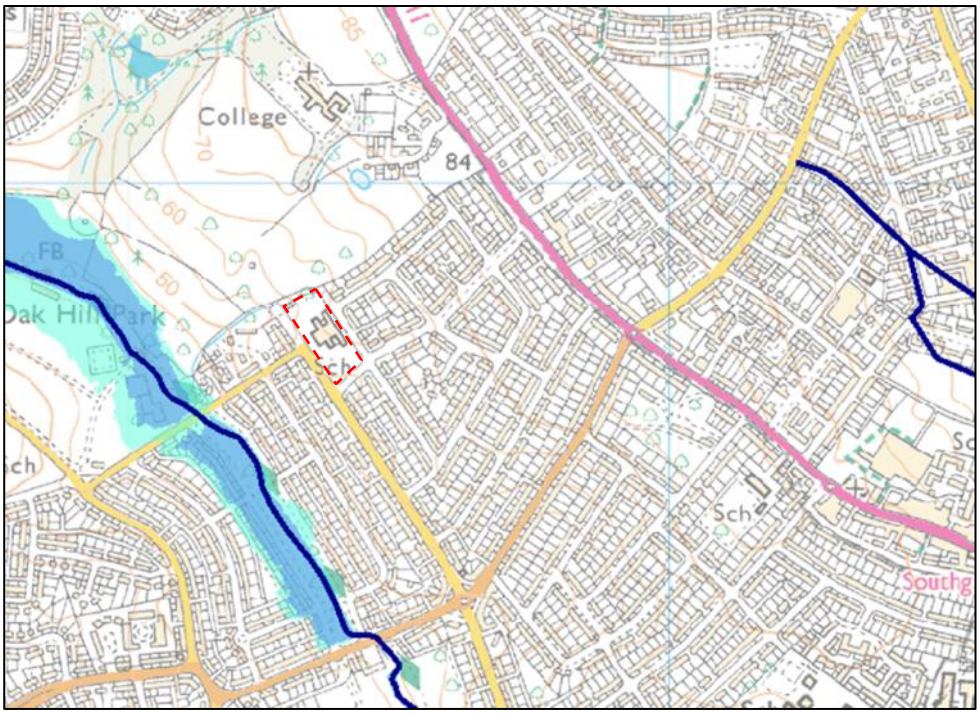

Figure 5 Flooding from rivers or the sea. Reproduced from the Environment Agency website [Accessed 23 May 2013]

3.2.2 Soils and geology

The soil on site was not mapped by the Soil Survey of England and Wales as it is in an urban location, please see field soil descriptions below for soil information. Data from the British Geological Survey indicates that the site comprises the London Clay Formation formed in the Palaeogene Period. This formation would be unsuitable for deep bored soakaways.

3.3 Topographical (levels) survey

An important aspect of site evaluation and remediation is appropriate utilisation of the natural grade (slope) of the site to optimise future earthworks and effect rapid removal of excess water. Topographical data were collected at a sampling density of approximately 10,000 data points / ha using RTK-GPS equipment, which is accurate to within ± 3 cm; these data are

[1] (Anon. 1983. Ministry of Agriculture, Fisheries and Food Reference Book 345: The design of field drainage pipe systems. Her Majesty's Stationery Office, London. 20pp.)

appended using 0.5 m contour intervals. Due to significant tree cover, the GPS signal was intermittent and so the site was re-surveyed using a 'total station'.

The site has a gradient of approximately 11% falling E to N. The surface level at the lowest part of the site (north) is 59.00 m above sea level; the surface level at the highest part of the site is 65 m above sea level. Whilst this is an advantage for the shedding of excess surface water, the slope is currently too steep to provide a recreation/playing area that conforms to Sport England guidelines for recommended slopes for sports pitches.

3.4 Electromagnetic inductance (EMI)

EMI scanning is a non-invasive method for assessing the degree of variation in soil type and/or condition. The results are predominately affected by clay content and water content and, therefore, the technique provides a rapid means for determining the most appropriate locations around a site for conducting more detailed analyses of the soil, including the excavation of soil test pits. Very often, the EMI scan can also detect the presence of existing drainage infra-structure, electricity cables or water mains.

Unfortunately EMI scanning operation was compromised by significant tree cover compounded by topographical and size constraints of the area and so the location of Trial Pits was identified through experience.

3.5 Proposed pitch layout and grading

In terms of pitch orientation, Sport England has published guidance on optimum pitch orientation for a range of sports (Figure 6). Sport England guidance for pitch orientation is not relevant for this project due to the size and geometry of the site. Orientation of any playing surface would be based on practical solutions that meet with the design possibilities, especially given the size constraints of the proposed area to be renovated.

Gradients across and along the existing recreation area (Table 1) are outside Sport England guidelines and would require re-grading of the site.

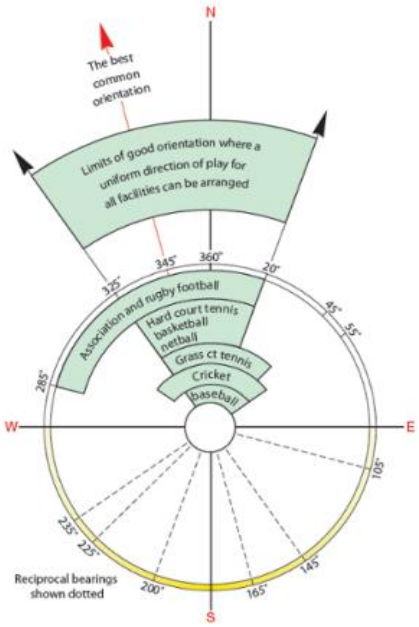

Figure 6 Optimum pitch orientations (Sport England)

Table 1 Summary of maximum recommended slopes for sports pitches as specified by Sport England compared with actual gradients measured on site.

Pitch	Sport England Guidance		Measured on site	
	Along length	Across width	Along length	Across width
Existing recreation area	1.25%	2.00%	~6%	~11%

Red box denotes gradient is outside Sport England recommendations.

3.6 Soil sampling

Two soil trial pits (TP1 & TP2, Figure 4) were excavated by hand to characterise the underlying soil profile. Soil samples were removed for laboratory analysis to determine soil texture and basic nutrient status.

3.6.1 Trial Pit Profile Description (TP)

TP1 was located in the Eastern area of the site and comprised 400 mm of CLAY LOAM topsoil (Figure 7) overlying plastic, mottled orange CLAY subsoil to a depth of over 1000 mm

(Figure 9). At 200 mm a 50 mm layer of stones was encountered; at 400 mm the CLAY subsoil became mottled (Figure 8) possibly indicating the saturated zone and groundwater table depth.

Volumetric water content was 50.4% at the surface, decreasing to 40.3% at 250 mm below ground level.

Grass cover was approx. 90% and predominantly annual meadow grass. Rooting depth was typically 100 mm. Thatch depth was <5 mm. Grass heights were maintained at 50-60 mm. Large amounts of invasive weeds were evident in the sward including Daisy, Creeping Buttercup and Chickweed.

No drainage infrastructure was encountered within the trial pit. Surface uniformity within the surrounding area was poor and would benefit from re-grading.

Figure 7 TP1 CLAY LOAM topsoil

Figure 8 Example of mottled sub soil (TP1)

Figure 9 TP1 400 mm CLAY LOAM topsoil over plastic CLAY subsoil, mottled in appearance to a depth of 1000 mm indicative of saturated conditions.

TP2 comprised 450 mm of very stony CLAY LOAM topsoil (Figure 10). Large amounts of stones were encountered at approximately 150 mm in depth. The stony structure of the soil meant augering past 450 mm was not possible. At 300 mm the clay loam became slightly mottled indicating a high ground water table (Figure 11).

Volumetric water content was 38.4% at 50 mm below ground level, increasing to 39.9% at 220 mm below ground level.

Grass cover was approx. 90% and predominantly annual meadow grass. Rooting depth was >250 mm and thatch depth was <5 mm. Weed cover was approximately 70% and consisted of Plantains, Daisy and Creeping Buttercup.

No drainage infrastructure encountered within the trial pit. Surface uniformity was poor with significant undulations.

Figure 10 TP2 Poorly structured CLAY LOAM topsoil

Figure 11 TP2 comprised 450 mm of CLAY LOAM topsoil (very stony).

3.6.2 Soil Texture

Laboratory analysis of soil texture confirmed field observations (Table 2), with the exception of the topsoil in both TP1 and TP2 which was classified as CLAY LOAM in the field; however subsequent analysis confirmed the material as CLAY.

Table 2 Soil texture

Trial Pit	Depth (m)	Sand (%)	Silt (%)	Clay (%)	Classification
1	0.00 – 0.40	21	37	42	CLAY
	0.40 – 1.00	7	38	55	CLAY
2	0.00 – 0.20	25	38	37	CLAY
	0.20 – 0.45	24	36	40	CLAY

3.6.3 Topsoil Nutrient Status

Samples of topsoil were sent to a contract laboratory for analysis of nutrient status (Table 3). All pH values are within the recommended range for turf grass growth. Generally nutrient status is good, reflecting the high clay content soils. Additional P fertiliser will be required during the grow-in of new grass.

Table 3 Topsoil nutrient status

Trial Pit	pH	Phosphorus (P) (mg/l)	Index	Potassium (K) (mg/l)	Index	Magnesium (Mg) (mg/l)	Index
1	7.3	12.8	1	200	2+	315	5
2	6.3	15.2	1	209	2+	377	6

In summary, were it not for the significant slope on site the surface would be poorly drained as the CLAY topsoil sits on impermeable CLAY subsoil. The result is a playing surface that is

poorly drained during winter months and following high intensity/duration rainfall events at other times of the year.

Excessive earthworks can compromise soil structure inhibiting the natural drainage capability. If significant cut and fill was employed to address the excessive gradients across the site, then consideration should be given to the installation of a surface by-pass drainage system. These systems work by intercepting rain water at the surface before it has had an opportunity to soak in to the soil profile, and then removing this water to a system of piped drains. Typical systems would comprise sand grooves (Figure 12) linked into a system of lateral drains beneath the playing field.

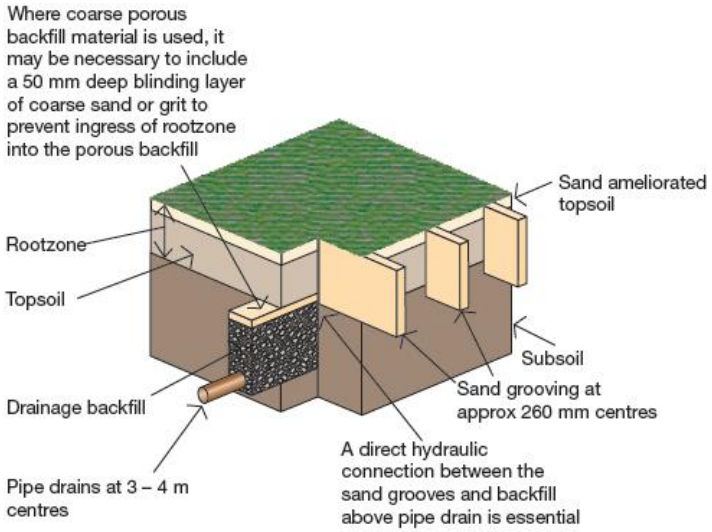

Figure 12 Typical drainage system for controlling high groundwater (Ref: Sport England Design Guidance Note "Natural Turf for Sport", 2011

3.7 Existing drainage infrastructure

On inspection, a sewer drainage system was identified running NS through the site. A 150 mm sewer pipe was located at inspection chamber 1 (IC1). The sewer drainage runs north to an inspection chamber located in the North West of the site by the existing boundary in woodland.

On investigation there appeared to be no existing land drainage infrastructure. This is not surprising given the steep gradients across the site (Figure 13), the soil characteristics and size of the site - all factors which would contribute to the movement and shedding of excess water away from the school and recreation area. The underlying soil characteristics are of a type whereby infiltration rates will be extremely low. With potential outfall identified and located in the NE boundary of the site, the instalment of a land drainage scheme would be recommended. However this would have to be more thoroughly investigated during the design process.

Figure 13. Example of fall away from the school for the removal of excess water

3.8 Agronomic assessment

Specific agronomic detail has been provided in the description of trial pits in Section 3.6.1 but generally although grass cover is good (>90%), this is predominantly weed grasses (*poa annua*) that have been allowed to form tussocks and go to seed (Figure 14). The whole site encompasses a large variety of weed species, including Daisy, Creeping Buttercup, Chickweed and Plantain species. The site would benefit from removal of existing grasses (which would be necessary for topsoil regrading anyway) and reseeding with a hard wearing grass species such as perennial rye.

Figure 14 Poor grass condition on site.

As a short-term measure, the grass condition can be improved by following a careful turf management system encompassing selective herbicide applications, over-seeding and top dressing to fill any undulations across the site. However, this option would be counter-productive if any earthwork developments were to be carried out whereby the existing vegetation would need to be stripped.

3.9 Site usage

It is difficult to predict with any accuracy the likely improvement in hours of play achievable if the recreation area were to be renovated and a new drainage scheme installed as this depends on local weather conditions, schedule of use, age of participants and the quality of the on-going maintenance, however Sport England considers the following to represent a reasonable estimation (Ref: Natural Turf for Sport, 2000, ISBN 1 86078 103 9 – 2nd Edition, 2011).

Table 4 Sport England estimated usage levels

Drainage status	Adult weekly use* (hours)
Undrained	Under 2
Pipe-drained	2 - 3
Pipe-drained with mole drains	2 - 4
Pipe-drained with sand grooves	3 - 6
Pipe-drained with slit drains	3 - 6
Pipe-drained with topsoil and drainage layer	3 - 6
Pipe and slit drained	3 - 6
Pipe-drained with suspended water table	4 - 6

*The usage levels shown will increase by ~50 % for players 15 years of age and under.

3.10 Performance Quality Standards (PQS)

Performance Quality Standards (PQS) provide a recommended minimum quality standard for the construction and maintenance of natural turf pitches. PQS were originally developed via a voluntary technical consortium with representation from the Sports Turf Research Institute, National Playing Fields Association and the Institute of Groundsmanship, and have now been adopted by Sport England and Governing Bodies of Sport (Ref: Appendix 4 of Natural Turf for Sport, 2000, ISBN 1 86078 103 9 – 2nd Edition, 2011).

Sport England has produced a pro forma for summarising the condition of natural turf sports pitches by conducting a Performance Quality Standard assessment and comparing the results for a given site against minimum standards. The results of this assessment are presented in Appendix I.

3.11 Other issues

1. The current development proposal extends to the levelling (incl. significant cut and fill earthworks) and drainage of the existing recreation area at Any Town Primary School.

   Where funding cannot facilitate this, there are no other feasible recommendations that do not include earthworks to produce a playing area which conforms to Sport England's' requirements for protecting playing fields. Although size constraints will affect the usage of the area, at present, gradients across the site are not suitable for supporting structured PE activities.

4 SUMMARY AND RECOMMENDATIONS

4.1 Principal factors affecting the condition of the site

1. Any Town Primary School is located in an urban environment and has a small, steeply sloping grassed strip of land which is used for occasional informal recreation. The principal objective of this project is to establish whether this informal area can be developed so that it can support structured PE activity and a summer Sports Day.
2. The playing field is located in Flood Zone 1 (low risk), it is not over existing landfill and not situated in a Groundwater Source Protection Zone.
3. Site geology is the London Clay Formation which is slowly permeable and unsuitable for the installation of soakaway drainage outfall.
4. Based on the ADAS 345 method, a drainage scheme should be designed to accommodate a peak drain flow rate of approximately **5.1 L s^{-1} ha^{-1}**.
5. The site currently comprises poorly draining CLAY topsoil over deep CLAY subsoil. The results of the soil assessments indicate that soil decompaction will help increase infiltration rates but ultimately a surface bypass drainage system is required.
6. The principal site grades have a very substantial fall (11%). Although this will facilitate surface water movement, substantial earthworks (cut and fill) will be required to provide an area which can be utilised as intended.
7. Current agronomic condition is poor with the grasses allowed to go to seed and dominated by weed grass species (*Poa annua*). The existing vegetation should be stripped and reseeded following topsoil regrading to improve poor surface levels
8. Assessment of drainage status is not applicable due to the significant slopes identified on site. Should the area be re-graded then land drainage may be required due to the underlying soil characteristics of the site. Although no drainage infrastructure was identified, installation of land drainage would require an efficient outfall. A tributary of a nearby brook could provide sufficient outfall however the capacity of this system should be considered at the drainage design stage, along with necessary discharge consents and planning conditions.
9. With respect to nutrient status, the topsoil is generally in good order and only slightly deficient for the major plant nutrient Phosphorus. Therefore, it is recommended that the fertiliser regime be adjusted to increase the concentration of this nutrient. Soil pH in the range of 6.3 – 7.3 is ideal for the cultivation of perennial ryegrass species.
10. In its current state, it is anticipated that the number of hours of play that could be supported by the sports field without causing excessive wear and tear on the grass sward or damage to soil structure will be limited by the relatively low permeability of the topsoil and subsoil due to the high clay content.

4.2 Development options

Based on the findings from the site investigation, development options will need to address a combination of steep gradient, groundwater drainage and surface water drainage. The following options are tailored to address the various issues across the site and this is reflected in indicative costs presented in Section 4.3.

4.2.1 Option 1: Site remodelling (cut and fill), installation of a land drainage system (3 metre centres) and installation of a surface bypass drainage scheme (approx. 0.08 ha).

This option involves cut and fill earthworks to provide a plateau located centrally in the existing recreation area. Batter slopes will be incorporated into the design, leading from the existing path down to the plateau, and from the plateau down to the existing trees. This option will provide approximately 800 m^2 of recreation area.

1. Removal of existing vegetation.
2. Arboriculture works.
3. Cultivation of topsoil (ca 250 mm depth) to incorporate the organic matter residue.
4. Strip topsoil and remove to stockpile on-site for re-use.
5. Cut and fill earthworks of subsoil to create new levels.
6. Replace topsoil from stockpile and laser grade to final levels.
7. Stone pick.
8. Installation of a pipe drainage scheme linked to a new outfall.
9. Establishment of a new grass sward (including seeding and fertiliser).
10. Verti-draining of established sward to relieve compaction.
11. Installation of a secondary bypass drainage scheme.
12. Application of 3 x 8 mm of sand topdressing.

4.2.2 Option 2: Site remodelling (cut and fill), importation of additional subsoil material, installation of a land drainage system (3 metre centres) and installation of a surface bypass drainage scheme (approx. 0.07 ha).

This option involves the importation of subsoil to raise overall levels on site. The replacement of top soil will create one plateau flush with the level of the existing pathway. One batter slope will be needed near the trees to provide a usable plateau area of approximately 760 m^2.

1. Removal of existing vegetation.
2. Arboriculture works.
3. Cultivation of topsoil (ca 250 mm depth) to incorporate the organic matter residue.
4. Strip topsoil and remove to stockpile on-site for re-use.
5. Importation of sub soil to create new levels.
6. Replace topsoil from stockpile and laser grade to final levels.
7. Stone pick.
8. Installation of a pipe drainage scheme linked to a new outfall.
9. Establishment of a new grass sward, including seeding and fertiliser.
10. Verti-draining of established sward to alleviate compaction.
11. Installation of a secondary bypass drainage scheme.
12. .Application of 3 x 8 mm of sand topdressing.

4.2.3 Option 3: Site remodelling (cut and fill), installation of a retaining wall, installation of a land drainage system and installation of a surface bypass drainage scheme (0.1 ha).

This option involves a balanced cut and fill operation to provide a plateau suitable for recreation. The installation of a retaining wall parallel to the existing path will enable the level of the playing field to be lowered vertically which will maximise the usable space created. This option will provide a recreation area of approximately 980 m^2.

1. Removal of existing vegetation.
2. Cultivation of topsoil (ca 250 mm depth) to incorporate the organic matter residue.
3. Strip topsoil and remove to stockpile on-site for re-use.
4. Installation of a retaining wall.
5. Cut and fill earthworks of sub soil to create new levels.
6. Replace top soil from stock pile and laser grade to final levels.
7. Stone pick.
8. Installation of a pipe drainage scheme linked to existing outfall.
9. Establishment of a new grass sward, including seeding and fertiliser.
10. Verti-draining of established sward to alleviate compaction.
11. Installation of a secondary bypass drainage scheme.
12. Application of 3 x 8 mm of sand top dressing.

4.2.4 12-months maintenance post-construction

To assist with the development of sustainable projects, Sport England will want to see a post construction maintenance plan to ensure that project meets key deliverables at the end of the defects liability period (typically 12 months post construction). Depending on the construction timetable and funding requirements, it is possible that on-going maintenance will be required for the first 12-months following completion of the remediation works. This will include the following items:

1. Mowing.
2. Fertiliser application.
3. Compaction alleviation (e.g. Vertidraining).
4. Selective weed control (as required).
5. Pest and disease control (as required).
6. Overseeding
7. Sand topdressing

N.B.:

- **Earthworks should only be carried out under suitable weather and ground conditions (i.e. soil in a dry and friable state) to avoid structural damage.**
- **In order to maintain the playability of the surface in the longer-term, the site would benefit from light annual sand topdressing. This should be factored into the on-going maintenance budget for the site.**

4.3 Indicative cost estimates

Due to the small nature of the site it is pertinent to note that indicative costs may vary. Mobilisation of contractors and machinery may initially outweigh the actual cost of the works involved. Therefore prices are purely indicative and would be confirmed when the proposed works are tendered to specialist sports pitch construction contractors.

4.3.1 Natural turf pitch works

	Option 1 (~0.08 ha)	**Option 2 (~0.07 ha)**	**Option 3 (~0.1 ha)**
Removal of existing vegetation (flail mow and herbicide application)	£300.00	£300.00	£375.00
Arboriculture work	£300.00	£300.00	£300.00
Rotary cultivate existing topsoil	£300.00	£300.00	£375.00
Strip top soil and stockpile on site	£1000.00	£1000.00	£1,250.00
Cut and fill earthworks	£1,500.00		£1,875.00
Sub soil importation		£12,000.00	
Construction of retaining wall @ circa £60/m (excluding pedestrian guardrail)*			£3,120.00
Replace topsoil	£1000.00	£1000.00	£1,250.00
Final cultivations and (laser) grading	£500.00	£500.00	£625.00
Stone removal	£300.00	£300.00	£375.00
Installation of a piped drainage infrastructure including surface bypass drainage and reinstatement of the sewer that crosses the site.	£5,000.00	£4,375.00	£6,250.00
Grass establishment	£350.00	£350.00	£437.50
Vertidraining	£200.00	£200.00	£250.00
Sand topdressing (24 mm)	£1,200.00	£1,000.00	£1,500.00
Subtotal (ex VAT)	£11,950.00	£21,625.00	£17,982.50
Contractor Preliminaries	£597.50	£1,081.25	£899.12
Subtotal (ex VAT)	£12,547.50	£22,706.25	£18,881.62
Contingency (10%)	£1,254.75	£2,270.62	£1,888.16
Total (ex VAT)	**£13,802.25**	**£24,976.87**	**£20,769.78**

* *The construction of a retaining wall, of up to 1.5 m in height, parallel to the existing pathway, would require the installation of some form of pedestrian guardrail to restrict pupils from accessing the recreation area in an unsafe manner. Specialist advice on the most appropriate form and cost of this will be required.*

NOTES:

a. Costs are based on a general estimation of the works required. If conducted in isolation, the costs are like to increase and would need to be costed accordingly.
b. Costs assume that the arisings associated with drainage installation will be disposed of on-site.
c. Costs do not include temporary irrigation which may be required if dry weather is experienced during grass establishment.
d. Costs based on recent Contractors rates (2013).

4.3.2 12-months maintenance post-construction costs for Options 1, 2 & 3

	Whole Area
Mowing (30 cuts)	£900.00
Fertiliser x 3	£200.00
Verti-draining x2	£500.00
Selective herbicide (if required)	£100.00
Overseeding	£200.00
Pest and diseases control (if required)	£100.00
Subtotal (ex VAT)	**£2,000.00**

4.3.3 Summary of project costs

Option	Construction[1]	Maintenance[1]	Fees[2]	Total ex. VAT	VAT	Total Inc. VAT
1	£13,802.25	£2,000.00	£8,350.00	£24,152.25	£4,830.45	**£28,982.70**
2	£24,976.87	£2,000.00	£8,350.00	£35,326.87	£7,065.37	**£42,392.24**
3	£20,769.78*	£2,000.00	£8,350.00	£31,119.78	£6,223.95	**£37,343.73**

* *For Option 3, the construction of a retaining wall, of up to 1.5 m in height, parallel to the existing pathway, would require the installation of some form of pedestrian guardrail to restrict pupils from accessing the recreation area in an unsafe manner. Specialist advice on the most appropriate form and cost of this will be required.*

1 Includes 10% contingency but excludes VAT

2 Fees represent the fees (ex VAT) charged in Round 4 of Protecting Playing Fields by a Sport England Protecting Playing Fields Framework consultancy for design and specification, tender production and evaluation and contract administration (supervision).

4.4 Indicative work programme

With respect to timescales for completing the project, it is recommended that the construction works are only completed under suitable ground and weather conditions to avoid any potential performance-related problems later on.

The date for start of play is highly dependent on weather conditions during the construction phase and growing-in period.

Indicative programme for option 1, 2 & 3

	Year 1												Year 2											
Construction Works	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Mobilisation of Contractor(s)																								
Natural turf works/Hard Landscaping																								
12-months maintenance period																								
Sand groove installation																								
Overseeding																								
Ground ready for play																								

N.B. The precise date for the return to play is highly dependent on the weather conditions that prevail during the construction works and growing-in period. Play/use shall recommence upon approval from the Contract Administrator.

4.5 Implications of works on future maintenance, system longevity and usage

4.5.1 Maintenance issues

- With surface bypass drainage systems, such as that recommended for the pitch here, it is essential that adequate allowance is made for annual sand topdressing as this helps to protect the sand grooves (or sand slits) from contamination with topsoil. As a guide it is recommended that a minimum 5 mm depth of sand should be applied annually as part of the renovations programme. For option 1, 2 and 3, 5 mm depth of sand over the whole development area would equate to approximately 7 tonnes at a cost of circa £300 + VAT (2013 prices).

- Land drains can be prone to differential settlement (i.e. there can be some sinkage over the drain lines) as the soil surrounding the drain pipe dries out and shrinks; this is perfectly normal in new constructions. Whilst topping up drain lines is usually covered by the Contractor during the first 12-months following construction, it is possible that drains may continue to sink to some extent after this time. Therefore, there should be some allowance within the maintenance programme to ensure that drains are kept topped up.

4.5.2 System longevity

- Whilst only a guide, the piped drainage system should have an operational lifespan of approximately 25 years if well maintained (e.g. silt traps regularly inspected and emptied and collector drains flushed).

- If managed well (i.e. annual sand topdressing) and not over-used (please see Item 4.5.3 below), the sand grooves should have an operational lifespan of 5 – 7 years, hence a sinking fund should be in place to repeat this operation periodically. The cost for sand grooving for option 1 & 2 is estimated to be approximately **£680 + VAT** (2013 prices). For option 3 the cost of sand grooving would be **£850 + VAT**. Therefore a sum of approximately **£140 + VAT** (Options 1 & 2) and **£170 + VAT** (Option 3) should be set aside annually (over 5 years) for this purpose.

4.5.3 Usage

- Provided the site is well maintained, the type of drainage system proposed for this site should allow reasonable use without causing detriment to the grass sward or soil structure. In very wet conditions, usage may be less.

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Author: Matt Young

Released by: Dr Richard Earl

Signed: 

Date: 25th June 2013

5 APPENDICES

Appendix I Performance Quality Standards.
Appendix II Outline Maintenance Recommendations.

Appendix I: Performance Quality Standards

Client: Any Town Primary School Physical Site Survey date: 22 May 2013

Project Title: Northwood School

ELEMENT	LIMITS	METHOD OF TEST	Visit 1	Visit 2
Ground cover %	>70 for SH 25-30 >80 for SH 30-35	BS 7370 : P3 A6	✓	
Broad-leaved weeds %	<10	BS 7370 : P3 A6	×	
Sward height mm	20-60 PS 20-75 SM	BS 7370 : P3 A3	✓	
Thatch depth mm	<5	BS 7370 : P3 A7	×	
Hardness in g	35-200	STRI method of test using a 0.5 kg Clegg Impact Hammer from a drop height of 0.55 m	×	
*Water infiltration rate mm h^{-1}	5	BS 7370 : P3 A8	×	
Evenness (2 metre straight edge)	<20 mm	BS 7370 : P3 A6	×	
Slope: Direction of play Across play	<1.25% <2.00%	BS 7370 : P3 A5	×	
pH value	5.5 – 7.5	ISO 10390	✓	
GUIDANCE FOR ROOTZONE LAYER				
Maximum diameter	<32 mm	Particle Size Distribution	×	

KEY: SH = Sward Height PS = Playing Season SM = Summer Maintenance

* Based on previous experience of pitches on similar soils it is expected that once the soils are wet to depth during the winter, the rate of infiltration will decline to less than 5 mm / hr.

Visual assessment is an acceptable alternative method of testing, if undertaken by a turfgrass consultant who is able to satisfy the selection criteria identified within the Turfgrass Consultants – Construction/Upgrade Brief.

Assessment undertaken by: Matt Young Consultancy: TGMS Limited

Appendix II: Outline Maintenance Recommendations

Mowing. The grass shall be maintained between a height of 20 and 25 mm using cylinder mowing equipment. The grass should never be allowed to exceed a height of 30 mm. If the grass does become too long, the height of cut should be reduced gradually over 3 – 4 cuts allowing some time for recovery in between. N.B. On no account should the grass height be reduced by more than 50% on any one occasion. Overall, approximately 30 mowing operations may be required each year, depending on weather and growing conditions.

Fertiliser application. Allowance should be made for a sufficient number of fertiliser applications to maintain healthy growth and colour. The fertiliser regime should be based on the results of annual soil sampling to determine nutrient concentrations, but the following programme is provided as a guide:

- April 12:6:6 at 350 kg/ha
- September 5:5:20 at 350 kg/ha

Fertiliser shall be applied with appropriate equipment that ensures a uniform distribution.

Weed control. Apply a selective herbicide in the spring (if required) to combat the weeds present. This to be applied at least two weeks after the first fertiliser treatment (April) and at a time when grass growth is strong and healthy. NB. Do not apply herbicide during periods of potential turf stress, i.e. if the weather is hot and dry or if frosts are forecast. Apply herbicide strictly according to the manufacturers label recommendations and only by suitably qualified personnel.

Pesticide/Fungicide [If required]. A pesticide/fungicide application may be required should disease be present within the grass sward. An approved fungicide should be used with activity against the pathogens present and be applied following the manufacturers label recommendations by suitably qualified personnel.

Aeration / Compaction Alleviation. Verti-drain (or other similar de-compaction treatment) the pitches on at least two occasions in the spring and autumn. Use 18 mm diameter solid tines working to a minimum depth of 200 mm below the surface set to provide some heave. Verti-draining must not be carried out if ground conditions are too soft or during frost.

Additional aeration treatments (e.g. slitting or spiking) during the playing season would also be highly beneficial to maintain surface drainage rates. These treatments should only be undertaken when ground conditions are suitable.

Sand topdressing. Supply and spread an approved medium-fine sand suitable for sports use during the renovations period at the rate of 85 t/ha. After each application, the sand should be worked into the surface with brushes or drag mats.

Overseeding. Overseed the pitches and safety margins as required at the application rate of approximately 200 kg/ha immediately after the end of season topdressing application. Use at least three cultivars of perennial ryegrass chosen form the latest Turfgrass Seed booklet with live ground cover and visual merit ratings of 6.5 or more. Make at least two passes with seeding equipment designed to place the seed approximately 5 mm below the surface.

Divot repair [Playing season]. After each match, divot and tread the divots back into position. This will remove any bare soil which allows weeds and weed grasses to germinate. Filling in divots with seed/soil mix will help to maintain better grass coverage.

Renovation of worn areas [Playing season]. Areas of high wear should be dressed and seeded using a divot repair mix (seed/rootzone) during the playing season as required in order to maintain good grass cover. These areas should be hand watered (if necessary) to ensure rapid grass germination and establishment.

Line Marking [Playing season]. Line marking should be undertaken on a weekly basis during the playing season.

Appendix III: Development Option Drawings

LEGEND

Proposed Levels

- Major Contours - 1m Intervals
- Minor Contours - 25cm Intervals
- 1:3 Fill Slope
- 1:3 Cut Slope

Existing Levels

- Major Contours - 1m Intervals
- Minor Contours - 25cm Intervals
- Inspection Chambers

Revisions		
No	Date	Description

Notes

1) Earthwork Volumes
Cut = 275m³
Fill = 275m³
Net = 0m³ (balanced)

Drawing Status

Proposal

NORTH

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TGMS Ltd. Sports Surface Consultants

Job No.	TGMS0781.1
Scale	1:250 @ A3
Designer	Oliver Munro
Date	30th August 2013
Consultant	Matt Young

PROJECT

Any Town Primary School

CLIENT

Any Town Primary School

DRAWING No.

tgms0781.1-1

Proposed Levels
Option 1

LEGEND

Proposed Levels

- Major Contours - 1m Intervals
- Minor Contours - 25cm Intervals
- 1:3 Fill Slope
- 1:3 Cut Slope

Existing Levels

- Major Contours - 1m Intervals
- Minor Contours - 25cm Intervals
- Inspection Chambers

Revisions		
No	Date	Description

Notes

1) Earthwork Volumes
Cut = 58m³
Fill = 615m³
Net = 227m³ (Fill)

Drawing Status

Proposal

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PROJECT

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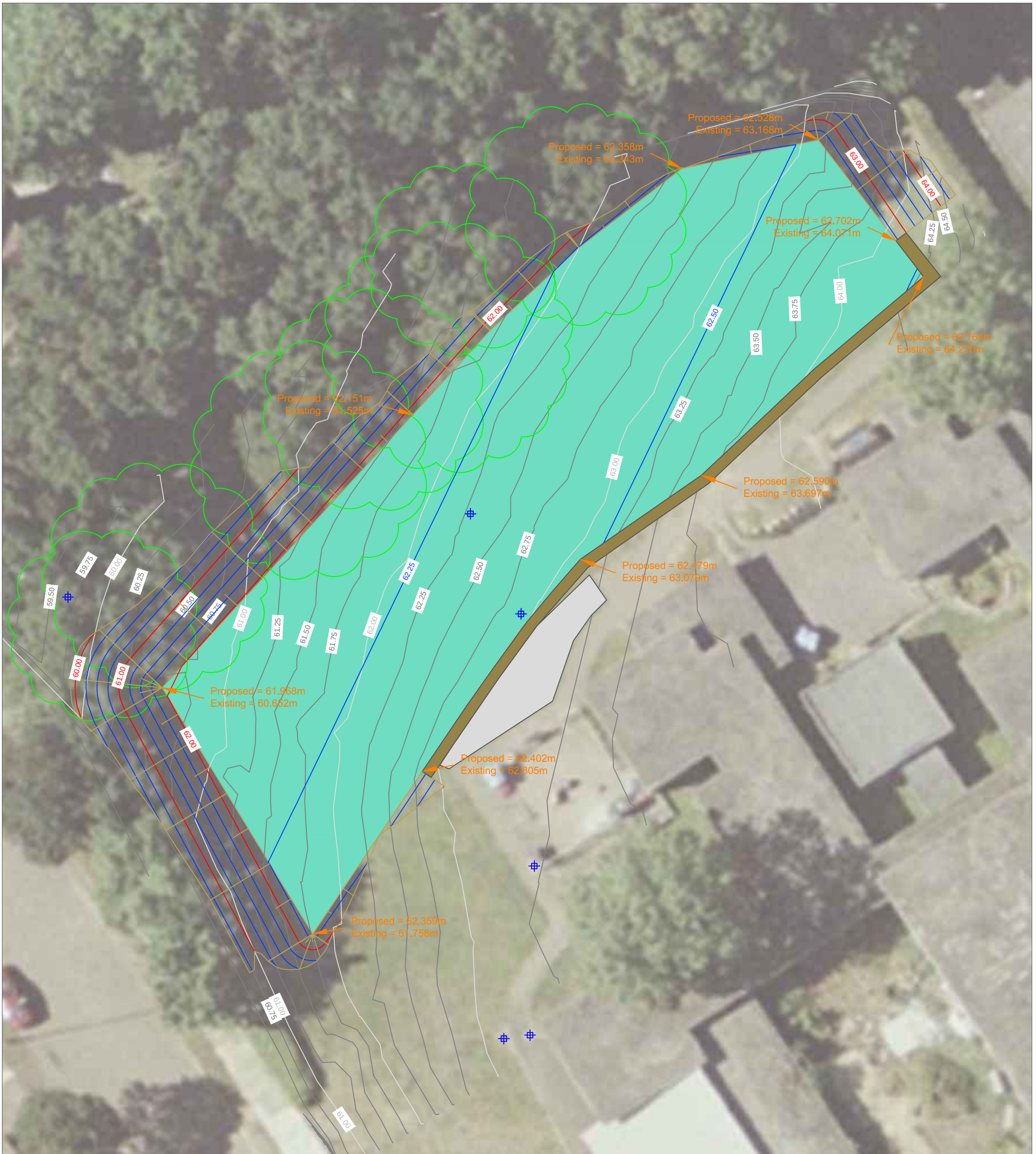
DRAWING No.

tgms0781.1-2

Job No.	TGMS0781.1
Scale	1:250 @ A3
Designer	Oliver Munro
Date	30th August 2013
Consultant	Matt Young

Proposed Levels
Option 2



LEGEND

Proposed Levels

- Major Contours - 1m Intervals
- Minor Contours - 25cm Intervals
- 1:3 Fill Slope
- 1:3 Cut Slope

Existing Levels

- Major Contours - 1m Intervals
- Minor Contours - 25cm Intervals
- Inspection Chambers
- Gabion Wall

Revisions		
No	Date	Description

Notes

1) Earthwork Volumes
Cut = 312m³
Fill = 312m³
Net = 0m³ (balanced)

Drawing Status

Proposal

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Date	30th August 2013
Consultant	Matt Young

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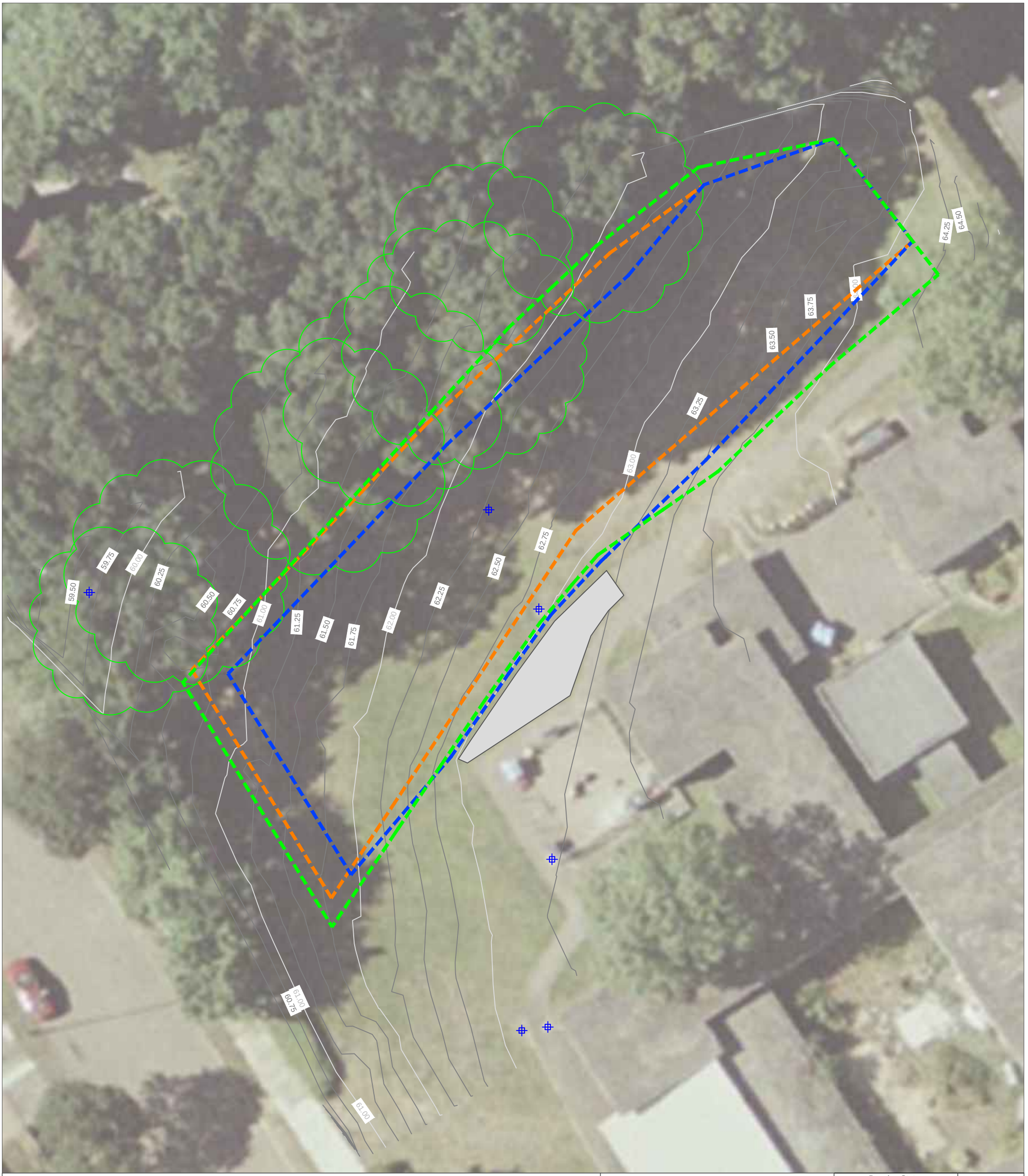
DRAWING No.

tgms0781.1-3

Proposed Levels
Option 3



LEGEND

Existing Levels

- Major Contours - 1m Intervals
- Minor Contours - 25cm Intervals
- Inspection Chambers
- Option 1 - Usable Area (797m²)
- Option 2 - Usable Area (762m²)
- Option 3 - Usable Area (979m²)

Revisions		
No	Date	Description

Notes

1)

Drawing Status

Proposal

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Designer	Oliver Munro
Date	30th August 2013
Consultant	Matt Young

PROJECT

Any Town Primary School

CLIENT

Any Town Primary School

DRAWING No.

tgms0781.1-4

Overview