SEATON PARK WETLAND PROJECT SCOPING STUDY

FINAL REPORT

Prepared for
Aberdeen City Council

Prepared by
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&
Walking-the-Talk

APRIL 2015

cbec Project #: UK14-1031

version: 1.8
checked by: HM

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1 EXECUTIVE SUMMARY

cbec eco-engineering UK Ltd (cbec) and Walking-the-Talk were contracted by Aberdeen City Council to investigate and design potential sustainable options for a section of Seaton Park, in the north of Aberdeen city. The study area, in the eastern part of Seaton Park, has been subject to flooding for a number of years and has begun to develop some characteristics of a natural wetland. The objective of the initial scoping phase of the study was to investigate the potential for enhancing this area as a wetland or for draining the site and returning it to improved grassland. Options had to consider the constraints presented at the site, mainly in terms of the way the site is used by the public and the existing infrastructure, as well as longer term maintenance requirements.

A full stakeholder engagement and public consultation exercise was conducted as part of the study, determining what types of improvement local residents would like to see. The overall comments reflected a desire for the wet area to remain to some extent, but to be enhanced by appropriate planting and facilities to interpret the wildlife present on the site. These findings were used to determine the final design option, which was developed based on a hydrological understanding and the existing topographical condition of the site with the aim of providing long-term stability and function. Engineering design drawings were then created for the final design option and a planting scheme was created to support the design. A management plan was also written to ensure that Aberdeen City Council has an understanding of the commitment and obligations for managing the wetland area in the long term.

2 INTRODUCTION AND PROJECT BACKGROUND

Seaton Park is located in the north of Aberdeen, on the boundary between the Old Aberdeen and the Bridge of Don city areas in the River Don catchment (see Figure 1). The area was purchased as a public park in 1947, but, prior to that date, was used for a variety of purposes, including horse racing. Over the last 10 years, an area of flooding has developed in the eastern section of the park. During winter periods, the area of open water within this flooded area has spread across the south-eastern section of the park and has blocked the access road at times. The north-eastern section of the park has also become damper in recent years, with extended periods of standing water spreading across a path and close to a rugby pitch. The extent of the winter ponding is indicated in Figure 2.

Figure 1. Location of Seaton Park and surrounding area.

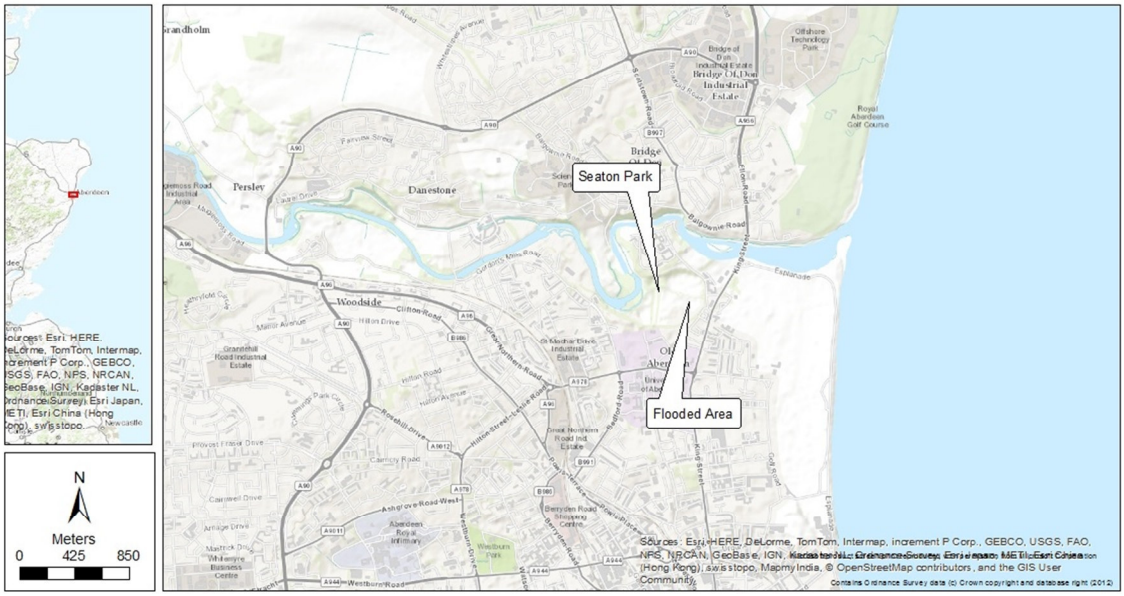
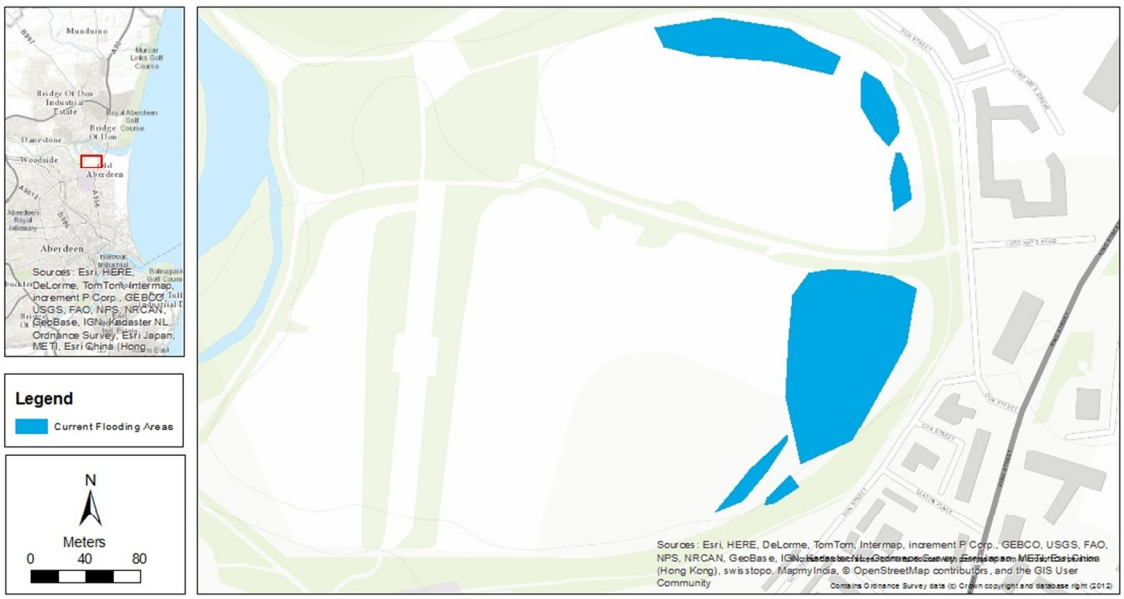


Figure 2. Extent of 2014/15 winter ponding and semi-permanent wetlands.



The Scottish Index of Multiple Deprivation (Scottish Government website, 2015) is based on geographic areas called datazones and allows for analysis of social and economic status of different parts of the country. Just beyond the eastern boundary of Seaton park is the Seaton datazone, which is within the most deprived fifteen percent of datazones in Scotland. Further to the west is the Tillydrone datazone, which is within the most deprived ten percent of datazones. To the south of the park lies the area of Old Aberdeen, including a number of Aberdeen University buildings and St Machars cathedral.

Seaton Park was assessed during the preparation of the Aberdeen City Council open space audit (2010). The park scored well for aspects such as being an attractive and appealing place and for supporting health and well-being, but scored less well for biodiversity.

Seaton Park is well used by the local population, including young families and students walking from the nearby halls of residence. Anti-social behaviour, in the form of graffiti and threats to personal safety, has occurred in the park and this needs to be taken into account in any design that encourages public interaction. Local views on the flooded area appear to be varied, with some residents wanting to see the wet area removed, whilst others enjoy the diversity of wildlife, particularly birds, which have begun to utilise the area.

Aberdeen City Council contracted cbec eco-engineering UK Ltd and Walking-the-Talk to establish why the flooded area has become established, local community views on whether the flooding should remain and design plans for how to enhance the area for the future.

To achieve this, cbec collated existing data, collected new data and modelled ground surface elevation to characterise the current conditions of the site (see **Section** 3), then used this to develop several conceptual restoration plans (discussed in **Section** 4). These were then presented to a wide range of stakeholders and used for a public consultation process, details of which are discussed in **Section 5**. The results from the engagement and consultation identified a preferred extent of water inundation/ wetness and enhancement features (**Section** 6), which were then related to the interpreted hydrological and topographical conditions of the site to produce detailed designs (**Section 7**) and costed. A management plan for the final design is presented in **Section** 8.

2.1 SITE HISTORY

2.1.1 Geology

The superficial deposits consist predominantly of alluvium and undifferentiated river terrace sediments characterised by silts, sands and gravels with isolated and localised areas of clay. The deposits are relatively young having been initially laid down towards the end of the last (Devensian) glacial period (in the period 14,000-20,000 years BP) and subsequently reworked during the Holocene.

The bedrock which underlines the entire park is the Brig O' Balgownie Formation, which is a well-rounded conglomerate with clasts of granite, psammite with some sandstone and mudstone interbeds which formed approximately 398 to 416 million years ago in the Devonian Period. Both the bedrock and superficial deposits are made up of mostly intergranular, porous, water bearing material characterised by a shallow groundwater table (saturated zone). There are also a number of groundwater issues and springs located around the perimeter of the park where there are bedrock outcrops and shallower superficial deposits.

2.1.2 Hydrology

The identified site is a semi-permanent, off-channel waterbody on the east side of the park. The current wetted areas are not directly influenced by the 'normal' flow regime of the River Don, with the exception of exceptional flooding events (the SEPA flood maps indicate that the 200-year return interval event inundates the park but measured events up to at least a ~40 year return interval do not). Therefore, the dominant hydrological influence on the area is from groundwater and the variation in water table and saturated zone level. Any change to the drainage of the site and alteration of the water table is likely to have a significant influence on the wetlands that have developed in the park.

2.1.2.1 Fluvial Flooding

Although it is likely that the position of the River Don through Seaton Park has been modified (see Section 2.1.3), the park was historically and remains part of the functional flood plain of the river, being periodically inundated during sufficiently large flood events.

Recent large flood events occurred in September 1995, October 2002 and November 2002. Figure 3 presents the areal extent of the 1995 flood and Figure 4 that of the November 2002 event. It should be noted that the flood extent in 1995 was not caused by overbanking of the River Don (see Section 2.1.2.2 below). The discharge, stage and return periods for each respective event are presented in Table 1 with the information supplied by SEPA's flood operations unit and recorded at the Parkhill measuring station (stage datum 32.44 mAOD). The return period is based on a single site analysis of annual maximum data at the station using the Flood Estimation Handbook (FEH).

Table 1. Recent flood statistics

Station	Peak Stage (mASD)	Peak Stage (mAOD)	Peak Discharge (m^3/s)	Estimated Return Period
September 1995	3.607	36.05	306.0	14yrs
October 2002	4.103	36.50	404.0	42yrs
November 2002	4.168	36.60	411.6	45yrs

Figure 3. Extent of 1995 flood event (note that the inundation of the park area is from a pluvial source).

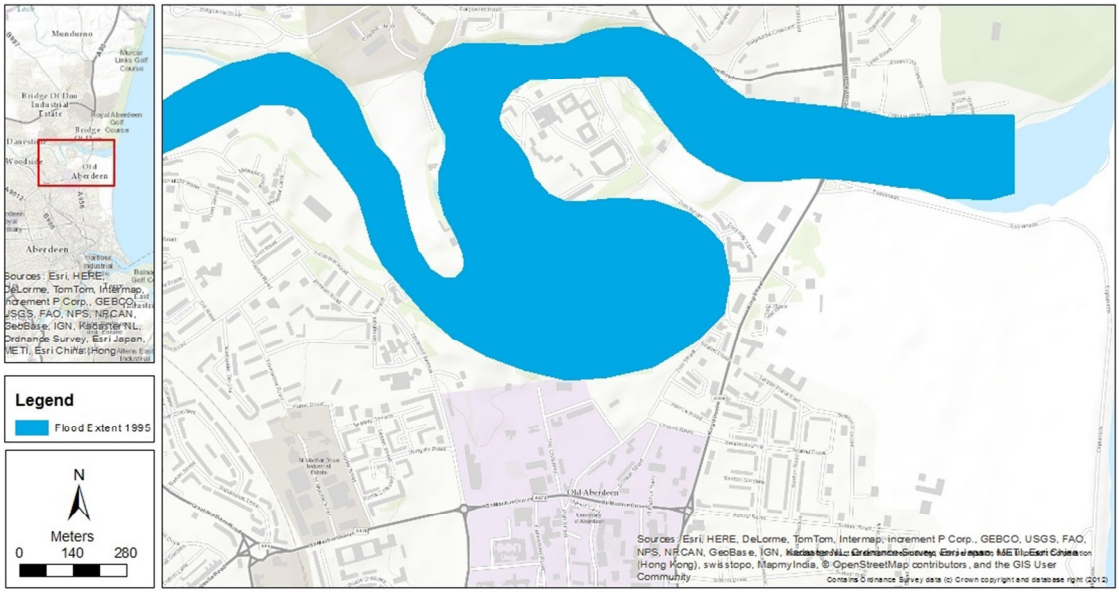
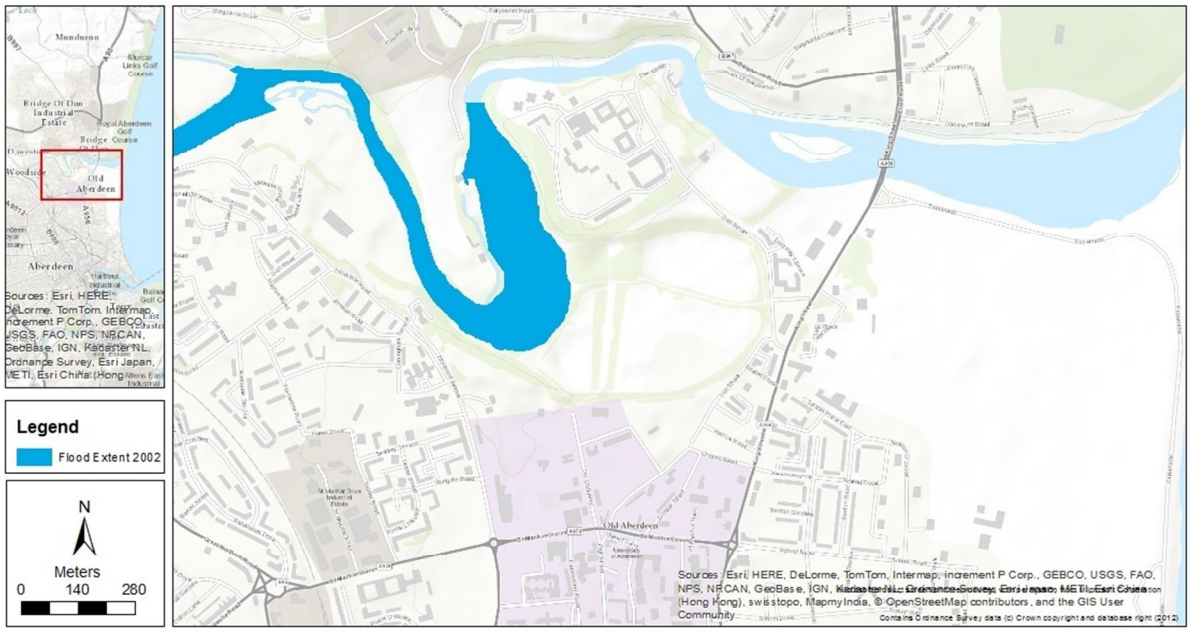


Figure 4. Extent of November 2002 flood event.



2.1.2.2 Pluvial Flooding

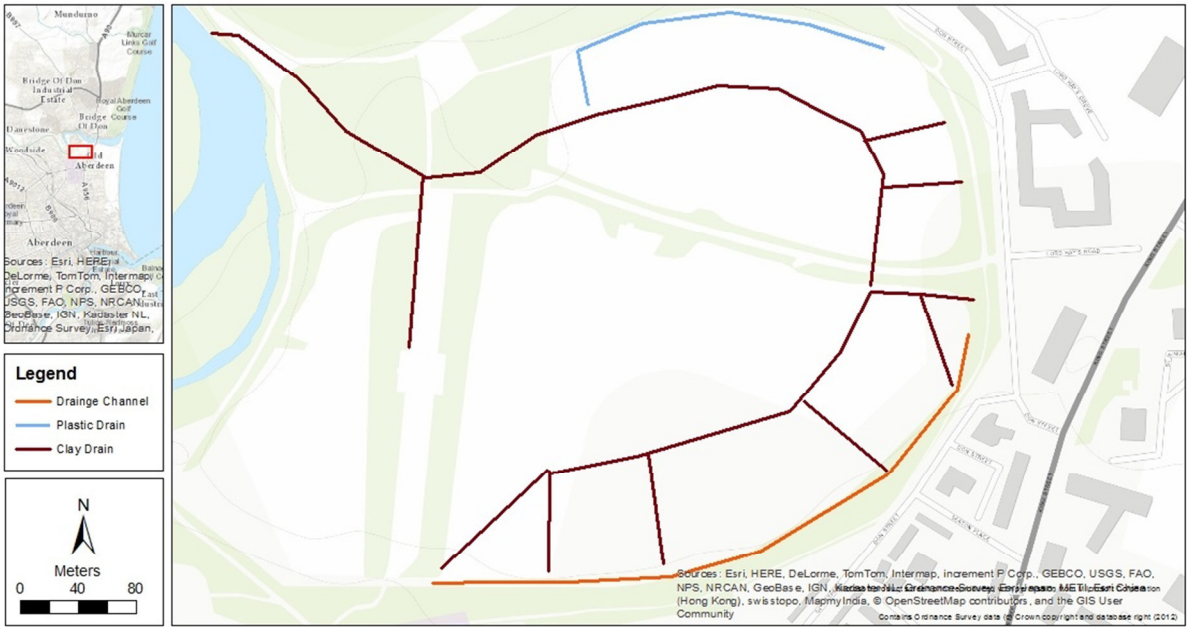
It should be noted that, although the flooded extents of the 1995 event appear to be a much larger episode than the November 2002 event, it was actually a smaller return period of 14 years compared with the 2002 event of 45 years (with associated lower stage and discharge peaks, see Table 1). This can be attributed to conditions prior to the flood, with precipitation for three days preceding the main flood peak of the 1995, much longer than for the 2002 event. This allowed for a greater rise in water table level in the park, contributing to the substantial pluvial flooding component to the event, all but absent in November 2002.

2.1.2.3 Drainage

The park also possesses a seasonally shallow groundwater table by virtue of local geological properties and topography. This becomes evident in lower elevation areas of the park and natural depressions where a series of ponds and wetlands of various sizes and depths have become established. The present conditions, although similar to those that would have historically been present, are relatively new and the result of a series of artificial drainage failures since 2007.

The current drainage system is believed to have been installed throughout the park prior to it becoming public property in 1947. Although there are no accurate schematics of the drainage system, discussions with and evidence from a previous park manager enabled a map to be created which shows the likely drainage layout. He described the approximate location for the drainage network within the park, and also advised on the type of pipe and previous management requirements of the system. Figure 5 collates this information into a map of the park drainage system.

Figure 5. Current and Partially Functional Drainage Network of Seaton Park.



Observations made during the site walk over and supporting evidence from park managers indicate that the clay drains to the north and south are no longer functioning. This also impacts on the drainage channel which, although containing water runoff from the south and south eastern park boundaries, is now stagnant and itself not being drained by the clay drainage network as it was originally designed to do.

The extent of the damage to the clay drains is unknown but sufficient enough to prevent a water table reduction and allowing for a semi-permanent elevation in water levels and the establishment of the ponds and wetlands as seen in Figure 2. According to the staff that have worked and managed the park prior to the initial damage to the drainage network (thought to have occurred in 2007), the park drainage was fully effective and the park was significantly dryer. However, it is clear that the drainage system required ongoing maintenance to avoid blocking and damage from tree roots.

2.1.3 History & Archaeology

Using expert judgement based on the morphological characteristics of the River Don and the park and from associated alluvial deposits, it is thought that the park was at one time part of an active meander bed of the river. Indeed, the current wet area defines a low elevation zone that represents the old channel course, with the higher area adjacent to the west being the associated point/ scroll bar. However, the nature of the cut-off of this meander bend does not appear natural; it does not occur at the outside of a bend upstream (the typical natural location for meander bend cut-off) but near to the centre of a straight channel section. Thus, it is assumed that the meander cut-off was a human engineered process, likely in relation to providing grounds associated with St Machar Cathedral. It is unknown when this modification occurred but the historical 'James Gordon' map dated 1661 (see Appendix A) from the National Library of Scotland shows the park to be in broadly the same configuration as present. Therefore, any modification of the river is likely to have been made pre-1661. It is noteworthy that this map refers to the park as 'The Bishopps Ward' and identifies the outer boundary of the area as being 'marish' (i.e. wetland).

The park, as part of a broader 'Seaton Estate', was privately owned by a number of families including the Gordon family, lairds of the estate from 1640 – 1742. Anecdotal information indicates that the estate was then passed onto the Forbes family with marital links to the Hay family and remained in their possession for many generations until becoming a municipal park in 1947. Two bronze coins believed to date to the 17th century and a bronze blade of unknown origin have been found within the park boundaries. Many of the garden walls and boundary stones are also believed to be from the 17th century forming parts of the formal gardens of Seaton house and St. Machar's Cathedral. (*Royal Commission on the Ancient and Historical Monuments of Scotland*).

3 CHARACTERISATION OF EXISTING CONDITIONS

3.1 COLLATION AND ASSESSMENT OF EXISTING DATA

Aberdeen City Council, cbec and Walking-the-Talk identified and gathered range of pre-existing datasets necessary for a thorough analysis of existing conditions, allowing for historical assessment and the conceptual and final designs to be robust. The datasets are described below.

3.1.1 Previous Reports and Historic Maps

Two flood survey reports were commissioned and owned by SEPA and their predecessor, the 'North East River Purification Board':

- Babtie Group (now Jacobs), River Don Flood Event of 8 - 12 September 1995, Flood extent & Floodplain Maps, 1995.
- JBA Consulting, Don and Berwichshire; Post-Flood Survey River Don Photographic Record December, 2002.

A number of historical maps of Seaton Park from the National Library of Scotland were also obtained.

3.1.2 Water Quality Data

No water quality data exists for the area of open water within the flooded section. During this scoping exercise, it was discovered that the toilets were not on mains drainage, as first suggested, but on a septic tank and soakaway system. Consideration should therefore be given to testing water quality to establish any potential contaminants which may be in the water, as the efficacy of the septic tank is unknown. This is particularly important if the designs implemented are intended to encourage greater interaction of the area by the public.

3.1.3 Topographic Data

A commissioned topographic survey for the specific area of interest (undertaken by CWS Surveys Aberdeen Ltd) was supplied by Aberdeen City Council. Supplementary survey and production data of the area of interest was conducted by cbec (described in greater detail in **Section 3.3**).

3.1.4 Service Plans

Aberdeen City Council supplied several comprehensive plans of the park and surrounding areas. Service maps included hydrological and drainage information, telecommunications, gas supply network and electricity supply/ network produced by Scottish Water, Vodafone, Scottish Gas and Scottish and Southern Electricity, respectively.

3.2 INITIAL RECONNAISSANCE SITE ASSESSMENTS

Several visits to Seaton Park were conducted by the project team during January 2015. These included:

- A site walk-over with the Friends of Seaton Park to establish local stakeholder priorities for the site.
- A site walk-over with Aberdeen City Council planning staff to establish organisational priorities for the site.

- A site walk-over with Aberdeen City Council ground staff to establish drainage patterns and existing site infrastructure.

In terms of physical character, the site visits identified a large area of standing water on the southern side of the access road (Figure 6). Adjacent to this there is an old drainage channel which is currently blocked with no water movement visible (Figure 7). To the north of the access road there are several areas of standing water greater than 100 mm depth (Figure 8). These areas are impacting on the rugby pitch and on the circular path which would otherwise extend around the northern section of the park (Figure 9).

Figure 6. Area of open water on the southern side of the access road.

Figure 7. Drainage channel around park south and east perimeter.

Figure 8. Damp areas to the north of the access road.

Figure 9. Flooded path (north side of park).

3.3 TOPOGRAPHIC SURVEY AND SITE DEM DEVELOPMENT

The data used to capture the topography of the site was surveyed in the field (primarily by CWS Surveys Aberdeen Ltd but augmented by cbec in deeper areas of the southern wetted area). A surface model (Digital Elevation Model, DEM) of the site was prepared from the ground-based survey in AutoDesk Civil3D 2013 (Figure 10).

Figure 10. DEM of the study area of the park.

3.4 IDENTIFICATION OF PHYSICAL SITE CONSTRAINTS

Given the urban setting of Seaton Park and its usage by a wide range of the local population, there are significant physical constraints that impact on the options available for the flooded area. These include:

- Topography: The general existing topography of the site will dictate to a large extent what is feasible in terms of the layout of any wetland development. The conceptual designs produced were based on careful consideration of existing site topography.
- Existing drainage: There are several 'sets' of drainage to consider. These include the original clay pipes providing the main park drainage, the later additions of the polythene pipes around the edge of the park, an open drainage ditch and the Scottish Water storm overflow pipes. There is also anecdotal evidence from the former park manager that the drain running from the south side into the north side rises slightly under the road, causes a blockage between the two halves of the park.
- Anti-Social Behaviour: Seaton Park has suffered from some anti-social behaviour in the past. Episodes of graffiti have occurred in recent months and there is a risk of attacks on people using the area after dark. Any design should therefore avoid increasing the risk to personal safety. For example, enclosed areas (such as bird hides) or blind corners on paths should not be introduced to the site.
- Septic tank drainage: It appears that the public toilet in the park car park is not connected to mains drainage but instead runs to a septic tank with soakaway. At the time of survey, this tank required emptying and the lid also required a permanent fixing to prevent entry to the

tank chamber. The run-off from a fully functioning septic tank should not impact on adjacent water quality. However, septic tanks can easily be affected by incorrect maintenance or by the use of strong cleaning chemicals in the connected toilets. As the public toilet is assumed to be cleaned by a private contractor, who may use different staff members at different times, there is a likelihood that the cleaning chemicals will be such that they could impact the functioning of the septic tank. Therefore, the water draining into the soakaway from the tank may contain high nutrient levels and, potentially, faecal coliforms and other harmful bacteria. This water will be mixing with the water within the flooded area and therefore pond dipping and other activities in the water should not be promoted. One option for rectifying this is to consider connecting the toilets to mains drainage.

- Road access: The main entrance road to the park goes between the two flooded areas. This access needs to be maintained and should not be allowed to be flooded (evidence suggests that this floods under extremely wet periods).
- Recreation: The park is used by a range of visitors, including young families and people with dogs. Any design therefore needs to minimise risks to park visitors, bearing in mind that this will include young toddlers, running dogs and those with reduced mobility. Running dogs also need to be discouraged from entering the open water areas, where they may have negative interactions with local wildlife, including birds.
- Drainage ditch: There is an open drainage ditch running along the perimeter of the southern extent of the site. This has become blocked and is full of water. It has very steep sides which could present a health and safety risk. Ideally the sides of this ditch should be changed to a shallower gradient.

4 CONCEPTUAL DESIGN DEVELOPMENT

Options for the extent of the wetland areas were based on different levels of drainage intervention, from none (the current situation of 'very wet') to reinstating the failed drainage pattern and enhancing it to aim for fully dry grassland ('very dry').

The DEM produced from the topographic data was used to assess existing conditions and determine physically appropriate design options for the site. The resultant maps were used to build a conceptual drawing incorporating the potential features such as enhanced wetland hollows, 'swales' connecting the perimeter drainage ditch, viewing platform and the extents of planting.

In considering the management options for the site, the underlying philosophy in developing the conceptual designs was, as much as practicable, to enhance the existing natural topography of the site to promote wetland habitats. Clearly, a fully natural wetland is not possible given the urban nature of the site resulting in a highly modified hydrology, associated water quality issues and it being closely associated with highly developed and economically/socially important infrastructure. Therefore, the design options mimic natural and self-sustaining wetland forms as much as possible, but within the identified site constraints.

Conceptual designs were presented for four basic options with three additional sub options. These designs were used in the stakeholder consultation process, as outlined below in **Section 5.2**. Conceptual illustrations of all these design options are provided in **Appendix C**.

4.1 SUB-OPTION – ADDING 'LUMPS AND BUMPS'

The basic design concept for the enhanced wetland was to enhance topographic differences within the already wetted area to provide greater wet-dry variability, increasing the potential for ecological diversity and the range of plant and animal species that could utilise the site. This was to be achieved through localised excavation of low areas with the addition of the associated won material onto higher areas. This processes followed the existing contour profile of the site so as to enhance the current variability in the ground surface that reflects, to some extent, the morphology of the historic meander bend through the site.

4.2 SUB-OPTION – ENHANCING THE HABITAT VALUE OF THE PARK

At the present time, the flooded area has limited plant diversity, with improved grassland and the occasional patch of soft rush (*Juncus effusus*). To enhance the park's biodiversity, a greater variety of wetland plants can be incorporated within the wet areas, as well as retaining some open water. The introduction of a wider range of plants can also assist with discouraging children and dogs from entering the open water area by providing a soft landscaping barrier. All plants should be native to North-East Scotland, not introduced species.

4.3 SUB-OPTION – IMPROVING THE VISITOR EXPERIENCE

Outline ideas were incorporated to give the public an opportunity to enjoy the wetland areas safely whilst minimising the potential impact of people on the wildlife. Other options for repairing the paths and preventing future flooding of the rugby pitch and the paths were also considered at the conceptual design stage.

5 PUBLIC CONSULTATION AND STAKEHOLDER ENGAGEMENT

The stakeholder engagement and consultation section of the Seaton Park wetland project scoping study involved the following actions:

5.1 INITIAL CONSULTATIONS WITH KEY STAKEHOLDERS

Seaton Park is popular with local residents and has its own 'Friends of Seaton Park' group. It was therefore considered important to consult with both the Friends group and the local Community Council at an early stage. These meetings took place in January, and the information gathered is outlined below:

5.1.1 Friends of Seaton Park

Both Sheila Gordon and Hamish MacKay from the Friends group attended a meeting with Tamsin Morris on January 7th, 2015. All areas of the park were walked and the extent and changes in the flooded area were discussed. The diversity of views on the presence of the flooded area were highlighted, as well as information on which sections of the park were used for informal recreational activities. Potential consultation opportunities were discussed, including locations for display boards.

Subsequently, Tamsin Morris of Walking-the-Talk attended the Friends of Seaton Park steering group meeting on January 12th. Information about the scoping study and its aims and objectives was presented and the group were asked for their ideas on potential consultation options. They were also asked how the flooded area had developed and for their views on how it could be enhanced and developed. It was clear that there was a wide range of views, ranging from maintaining a wet area to drying out the area entirely and returning it to formal parkland.

5.1.2 Old Aberdeen Community Council

A meeting of the Old Aberdeen Community Council was attended on January 20th. A brief presentation was given, outlining the various steps to be undertaken in the scoping study and how a similar project on the East Tullos Burn had developed. Again, there were a range of views and ideas with many attendees keen to see the wetland area drained.

5.1.3 Emails to additional stakeholders

After the project start-up meeting in January 2015, initial introductory emails were also sent to the stakeholders listed below. These emails included a brief initial description of the project, an explanation of the proposed consultation process and an opportunity to provide specific input at this stage of the project if desired.

- Old Aberdeen Heritage Society
- Scottish Water
- Old Aberdeen / Seaton Councillors x 4
- Friends of Cruickshank Botanic Gardens
- Scottish Natural Heritage
- Seaton Primary
- St Peters RC Primary school
- Riverbank School
- Sunnybank School
- St Machar Cathedral

- North East Local Biodiversity Action Plan
- Aberdeen City sports development

Responses were received from SNH, requesting that native species be used in any wetland planting activity and from one of the Councillors, checking the budget implications for the Council.

5.2 PRODUCTION OF SITE VISUALISATIONS AND CONSULTATION DISPLAY

Based on the early stages of the engineering design work and initial discussions with stakeholders, a series of outline designs were produced on a Google Earth base image. These showed the likely extents of water across the park within four different options. An artist's impression of how the south side of the park would look within these options was also prepared. It was not possible to find a location within the park which could be used to show a ground view of the whole park, as most of the higher areas within the park are wooded.

The four options which were illustrated in this were:

- Very wet – maintaining the park as it currently is, with wet areas to both the north and south of the road
- Quite wet – draining the area around the rugby pitch on the north side of the park, but maintaining much of the wet area to the south
- Quite dry – draining all of the north side and reducing the wet area on the south side
- Very dry – draining the entire area

The Google Earth plan views with artist's drawings can be seen in **Appendix C**.

Additionally, drawings were prepared showing how the wet areas could potentially be enhanced. Options that were illustrated were:

- The addition of wetland plants
- The addition of enhanced topography 'lumps and bumps' (as described in Section 4.1)
- The addition of a viewing platform

The drawings were printed at A3 size and were incorporated into a display that included text explaining the aims of the project and the potential pros and cons of each design option. For each of the options highlighted above, consultees were given the opportunity to express a preference using coloured dots, which could be placed next to their preferred option. The display also included an opportunity for general comments/suggestions (using Post-It notes and an envelope).

5.3 CONSULTATION LOCATIONS

In order to try and gather views from as many people as possible, the display containing the various consultation options was made available in the Old Aberdeen / Seaton area for just under two weeks. It was housed in the following locations:

- Lidl, King Street store from Monday 16th February to Thursday 19th February
- Brig O'Don restaurant – Friday 20th February to Sunday 22nd February
- St Machar cathedral – Monday 23rd February to Friday 27th February

At each site, the display was set up in a prominent place and a supply of sticky dots left for people to provide feedback (photos of the display are presented in **Appendix D**). In total, the display was available for public comment for approximately 118 hours. However, by necessity the display was un-manned for much of this time, so it is unknown how many people looked at the display and for how long.

Each time the display was moved to a new location, the number of spots entered for each option was recorded. A blank sheet was used at each site, so that people could not see how other people had voted previously. The results from each site are shown below in Table 2. Comments on the displays are listed in **Appendix E**.

Table 2. Public consultation results.

Display Location	**Primary options**				***Sub-options for very wet to quite dry***			
	Very wet	**Quite wet**	**Quite dry**	**Very dry**	***Plants***	***Lumps and bumps***	***Viewing area***	***None of these***
Lidl	63	106	40	28	*58*	*31*	*53*	*5*
Brig O'Don	10	8	6	0	*10*	*9*	*14*	*2*
St Machar	6	19	12	0	*13*	*7*	*16*	*2*
Total	79	133	58	28	*81*	*47*	*83*	*9*

It can be seen that the quite wet option was most popular, followed by retaining the flooded area in its current state as 'very wet'. Of those who were keen to see the wetland area enhanced, the most popular options were to create a viewing platform and to use appropriate wetland plants, whilst the creation of extra topography was less popular. Relatively few comments were submitted on the display.

5.4 PUBLICITY AND ON-LINE CONSULTATION

To ensure that as many people as possible had the opportunity to comment on the design options, a press release was issued that highlighted the various locations for the display. This was featured in the Evening Express and the Press and Journal, as well as a short interview appearing on Original FM.

To accompany the press release, an on-line version of the consultation display was created, showing the various design drawings and an on-line voting system devised so that people could express preferences electronically. Posters were produced which highlighted both the on-line consultation and the various events; these were put up around the Seaton Park area, as well as within the University and at the Cathedral. The posters incorporated a QR code (similar to a bar code) that allowed users of smart phones to hyperlink directly to the consultation. This on-line consultation was also highlighted on Twitter feeds. A further email was sent to the stakeholders described in **Section 5.1.3**, outlining the details of the consultation events and providing a link to the on-line consultation, so they could also submit comments and preferences on-line. The results from the on-line consultation are listed below in Table 3.

Table 3. Results of online consultation.

Primary options				***Sub-options for very wet to quite dry***			
Very wet	Quite wet	Quite dry	Very dry	*Plants*	*Lumps and bumps*	*Viewing area*	*None of these*
111	114	21	12	*206*	*100*	*127*	*18*

Again the quite wet option was most popular, followed by retaining the site in its current condition (very wet). Wetland plants and a viewing platform were also popular and there was increased interest in topography. A significant number of respondents also submitted comments. The combination of the on-line and event votes resulted in a total of 556 respondents, with percentage support rates for each option shown in Table 4. Percentages cannot be calculated for the enhancement options (plants, viewing area and lumps and bumps) as respondents could select several of these options at once.

Table 4. Combination of on-line and event consultation results.

Very wet	**Quite wet**	**Quite dry**	**Very dry**
34%	44%	14%	7%

It should be noted that these results cannot be considered a statistically valid representation of all stakeholders, given the lack of control over the display whilst it was un-manned. However, they provide an indication of likely public preferences.

6 INDENTIFICATION OF PROPOSED DESIGNS

The consultation results and comments from the stakeholder/ public engagement process were assessed in relation to the conceptual options to produce a final design.

6.1 PHYSICAL WORKS

The community consultation revealed a preference for the retention of a wet area on the south side of the park access road and a reduction in the wet area to the north. There was a preference for the wet area to be enhanced with appropriate wetland planting and the introduction of a viewing/ interpretative area. There was some support for the introduction of additional topography to the site ('lumps and bumps'), but the desire for this was not as strongly supported.

To create this preferred option, the following physical works will be required:

- Installation / repair of drainage on the north side
- Excavation of lower areas within the south side wet area to create some permanently wet areas (the won spoil to be used to enhance higher elevation areas)
- Re-profiling of areas within the south side to create more appropriate slopes for both health and safety and plant diversity.
- The construction of a viewing platform.
- The introduction of an appropriate range of wetland plants.

6.1.1 Detailed design considerations

The initial conceptual designs were based on analysis of the detailed site DEM in combination with the local constraints (**Section 3.4**). To produce the detailed design, the existing site DEM was modified to enhance topographic variability (to provide a greater range of wetland conditions), while maintaining the general pattern of high and low elevation areas through this region of site. This aims to provide a greater gradient of 'wetness' through the site, with lowered elevation areas having a greater probability of remaining wet all year round, grading into increasing high/ dry areas with associated zones of appropriate wetland plant species. Rather than simply lowering elevation at specific locations to create 'holes' in the wetland design, lowered and raised elevation areas were graded into one another and the existing surface to produce a 'smoothed' surface.

Although the proposed changes to ground elevation at a specific location are relatively modest (maximum of ±300 mm), it will be important to ensure that ground conditions are appropriate for these works. More detailed assessments of ground condition were beyond the scope of this study. It may, for instance, be necessary to confirm whether or not a shallow impermeable soil/ sediment layer exists below the current ground surface. Such a layer could be responsible for the maintenance of a wetland feature that retains surface water and may be disrupted through construction excavation (i.e. by machinery 'punching a hole' through the base of the wet area, allowing water to drain away). To ensure that conditions are appropriate for the proposed designs, a ground investigation involving a number of trial pits or core samples (around five through the extents of the area to be excavated) should be considered.

6.1.2 PHYSICAL DESIGN COSTS

Cost relating to project earthworks is based on volumetric comparison of the existing and design topography. A typical cost of £7 per m^3 is assumed for initial excavation (CUT) of earth. Where excavated materials are reused within the designs (FILL), an additional £7 per m^3 is assumed. Where

excess excavated materials cannot be reused within the design it is assumed that it will be redistributed locally. There is an estimated associated cost of £13 per m³ for the additional handling. If the excess materials cannot be reused locally and require additional haulage and landfill charges, a generic estimate of the disposal cost of these materials rises to approximately £60 per m³. The volumes of materials and associated costs for the design are presented in Table 5 below. N.B. These costs do not include mobilisation of plant and site set up.

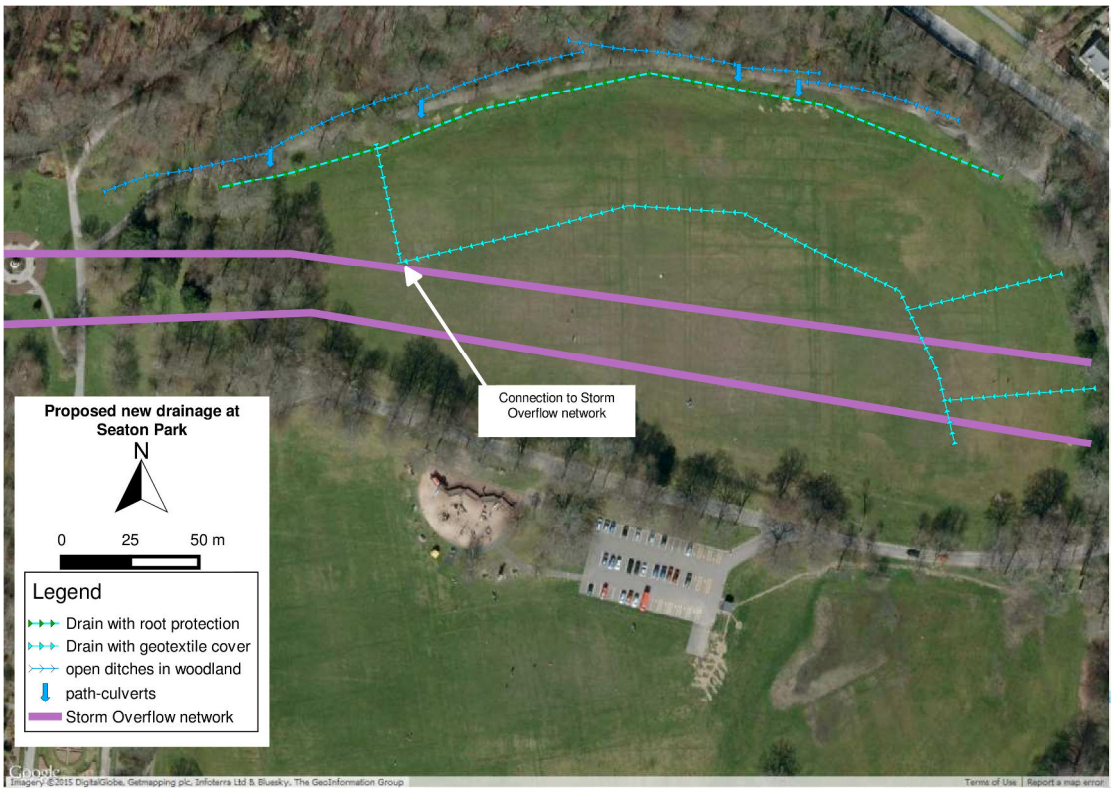
Table 5. Earthwork cost estimates.

Item	Volume of Material	Estimated Cost
Cut Material (£7 /m³)	458 m³	£3,206
Fill Material used in quantified design (£7 /m³)	172 m³	£1,204
Materials Redistributed Locally (£13 /m³)	286 m³	£3,718
Total Estimated Cost of Earthworks (with local redistribution of excess materials)		**£8,128**

6.1.3 Drainage design considerations

As detailed in **Section 5**, the community consultation revealed a preference for the retention of a wet area on the south side of the road and a reduction in the wet area to the north of the road. The older clay drainage network on the site is known to have failed at certain locations and is likely to be beyond economical repair. In addition, any clay drainage system is likely to require ongoing maintenance to avoid further damage in the future. It is therefore recommended that a new drainage system be installed to facilitate the reduction in the wet area to the north of the road and allow the rugby pitch, which is often inundated during the winter months, to become useable again. Due to the highly porous nature of the alluvial deposits and their associated transitivity it is likely that a new drainage network will be very effective at draining the site in line with the capability of the old drainage network before damage occurred. To avoid completely draining the area of the proposed wetland on the south side of the road, the drainage network will only be installed/ re-established in the area to the north of the road (Figure 11).

Figure 11. Proposed new drainage system to be installed.



Although the new drainage network will only be north of the road it is possible that it may also have an influence on the saturated zone in the areas to the south of the road, due to the highly porous nature of the superficial deposits and the development of a 'hydraulic gradient' between the two areas. To avoid any potential drying out of the proposed wetland as a result of drainage, the drainage network will be installed at a depth between 4.5 – 4.9 mAOD, which is above the lowest point of the proposed south side wetland. This will not only allow the wetland to exist perennially (with the exception of unusually dry conditions) but remove the requirement for any management or additional control structures to regulate the minimum water levels of the wetland.

Conversely, during conditions where there is an excess of water in the wetland a simple over-flow arrangement can be installed draining water into a sump or directly into the Scottish Water managed storm drains that run through the site into the River Don. Initial correspondence with Scottish Water has indicated that draining excess water from the wetland directly into the storm drains could be acceptable. However, this would have to be confirmed by applying for a formal connection permission.

In order to avoid damage to the drainage network, it must be installed at a minimum depth of 300 mm beneath the design ground level and a porous geotextile sheet laid above the pea-gravel – this will help to spread the load of any machinery used to maintain the north side of the park. In addition, the drain next to the path along the northern margin of the park should be 'wrapped' in a root protector geotextile sheet to prevent tree root ingress.

In anticipation of arboricultural works, it is recommended that a designated crossing point be agreed with park staff. This would require a three metre wide geotextile lined 'half-tray' across the drain,

filled with 300 mm of type 1 aggregate. This crossing should be a minimum of 5 m long and be graded down to existing ground level on each side.

Two options exist for discharge from the drainage system:

- Replacement of the existing drain on the north side of the park which discharges directly into the river Don.
- Connection of the new drainage to the Storm Overflow system

The existing drain runs through trees so would need to be root protected and would be likely to need frequent maintenance. Replacement would be likely to cost approximately £7,500.

Scottish Water has indicated that it likely that there is available capacity in the Storm Overflow pipes, however some attenuation/ moderation of discharge flow may be required. It is also possible, in addition to a connection charge, that there may an ongoing charge for taking up capacity in the storm drain – at this stage it has not been possible to confirm the cost of connection or ongoing charges.

Connection to the storm drain may be the most practical option, requiring the least ongoing maintenance, but the cost of replacing the existing drain has been included in the budget estimates to help provide overall minimum costs of implementation.

6.1.4 Drainage Installation Costs

Costs for installation of the new drainage system have been approximated from general land drainage costs. This is higher than agricultural drainage rates but reflects the precision required on site and the need for geotextile layers to protect the drains.

Table 6. Estimated costs of drainage system.

Item	Quantity	Cost (ex VAT)
Root protected and geotextile covered drain	300m	£7,200
Geotextile covered drain	400m	£8,000
Replacement of discharge drain to river Don	310m	£7,500
Total drainage costs		**£22,700**

6.2 PLANTING SCHEMES

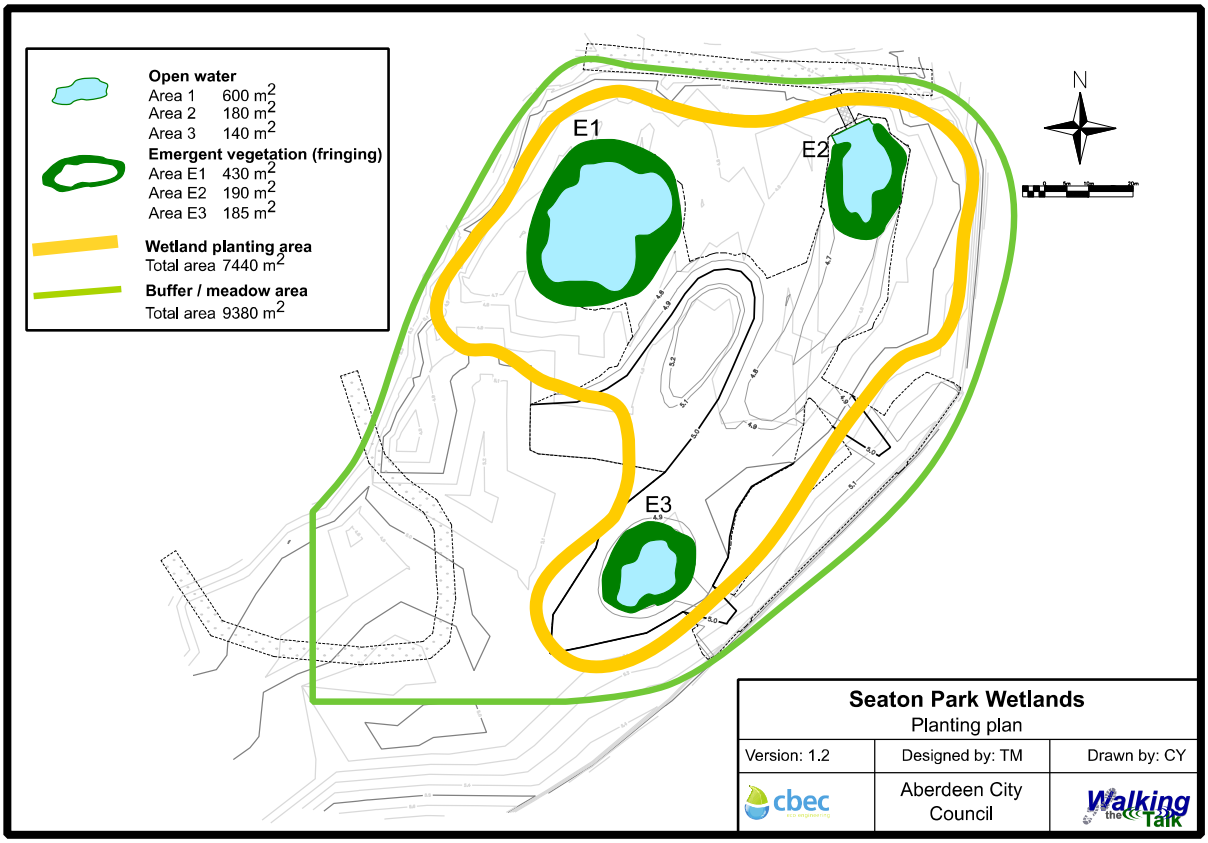
The public consultation revealed preferences for appropriate wetland planting within the south side wetland area. This planting should add to the biodiversity and visual amenity of the site but can also be used for structural landscaping, to help discourage toddlers and dogs from entering areas of deeper water. Seaton Park already contains a significant number of trees. Therefore, planting of trees around the wetland area is not proposed. As the wetland area is relatively small, any additional tree planting will be likely to encourage the site to dry out and will speed up the process of succession.

The plants required can be divided into the following categories:

1. Emergent wetland species: these species need to be in water and can be placed around the edges of the deeper water areas to provide a soft landscaping barrier (see Table 7).
2. Other wetland species: these species also thrive in heavily wetted areas, but will not provide any landscaping barriers (see Table 8). They can be on ground that dries out occasionally, but should be wet for the majority of the year.
3. Wet meadow/buffer species: these species grow well between the deeper areas where they will intermittently dry out (see Table 9).

The planting scheme uses four zones: open water, emergent vegetation, wetland area, buffer/ meadow which can be seen in Figure 12.

Figure 12. Proposed planting plan.



Open water areas: These areas will be under water for the vast majority of the year, and will not be planted up, to leave an area of open water.

Emergent vegetation/ fringing wetland species: These areas should be planted with emergent 'barrier' plants and should be wet almost all year round.

Wetland areas: These are outwith the deeper pools, but will still be wet for much of the year. The plants should provide colour and diversity, but will not necessarily perform any landscaping/ barrier role.

Buffer/ meadow areas: In order to prevent the existing 'improved' grassland of Seaton Park from encroaching on the wetland areas, damp meadow species should be planted as a protective buffer between the site and the wider park area. This buffer zone will help to discourage the 'improved'

grassland species (clover, Yorkshire fog, rye grass and other competitive species) from extending into the area. The more extensive the buffer, the greater the chance of the main wetland area flourishing. This area can be planted with seed and may require a small amount of scarifying prior to planting, depending on the extent of damage by machinery to the turf layer during construction. A standard wet meadow seed mix can be obtained from suppliers such as Scotia seeds. In order to obtain some early colour on the site, it is recommended that some annual arable weeds are mixed in, such as cornflower (*Centaurea cyanus),* corn marigold *(Glebionis segetum)* and corn poppy *(Papaver rhoeas).*

As the north side will be used for team sports, any damaged grassland areas/ drain infills should be replanted with a standard improved grassland mix in this area.

The species which have been selected are native to northeast Scotland and should have the best chance of survival in the local climate (see Table 7**,** Table 8 and Table 9). Some species have been included which are considered helpful in treating polluted water and which are commonly used in treatment wetlands (e.g. *Phragmites australis*). Whilst these will not mitigate any serious pollution events, they should help to reduce any accumulation of nutrients in the water.

Table 7. Recommended emergent/ fringing wetland species.

Common name	Latin name
Yellow iris	*Iris pseudacorus*
Common reed	*Phragmites australis*
Branched bur reed	*Sparganium erectum*
Common reedmace (bulrush)	*Typha latifolia*
Bottle sedge	*Carex rostrata*

Table 8. Recommended wetland species.

Common name	Latin name
Marsh marigold	*Caltha palustris*
Cuckooflower	*Cardamine pratensis*
Meadowsweet	*Filipendula ulmaria*
Marsh bedstraw	*Galium palustre*
Yellow iris	*Iris pseudacorus*
Greater birds foot trefoil	*Lotus pedunculatus*
Ragged robin	*Lychnis flos-cuculi*
Bog bean	*Menyanthes trifoliata*
Water mint	*Metha aquatica*
Water forget-me-not	*Myosotis scorpioides*
Common reed	*Phragmites australis*
Amphibious bistort	*Polygonum amphibia*
Marsh cinquefoil	*Potentilla palustris*
Lesser spearwort	*Ranunculus flammula*
Branched bur reed	*Sparganium erectum*
Marsh woundwort	*Stachys palustris*

Common name	Latin name
Valerian	*Valeriana officinalis*
Brooklime	*Veronica beccabunga*
Purple loosestrife	*Lythrum salicaria*

A standard wet meadow seed mix could potentially be used, or a bespoke mixture could be created using species such as the following.

Table 9. Recommended buffer/ meadow species.

Common name	Latin name
Meadow buttercup	*Ranunculus acris*
Devil's bit scabious	*Succissa pratensis*
Meadow foxtail	*Alopecurus pratensis*
Sneezewort	*Achillea ptarmica*
Selfheal	*Prunella vulgaris*
Meadow cranesbill	*Geranium pratense*
Greater birds foot trefoil	*Lotus uliginosus*
Common bent	*Agrostis capillaris*
Cornflower	*Centaurea cyanus*
Corn Marigold	*Glebionis segetum*
Corn poppy	*Papaver rhoeas*
Yarrow	*Achillea millefolium*
Selfheal	*Prunella vulgaris*
Sweet vernal grass	*Anthoxanthum odoratum*

For the improved grassland/ playing field areas, it is assumed that Aberdeen City Council has a standard grassland mix and this should be used to 'patch' any areas which are damaged during construction.

6.2.1 Planting specifications

Areas marked for planting should be planted with a mix of wetland plants from the species list above. Plants should be bought as plugs and planted at a density of approximately 5 plants per m^2. This density should be sufficient to give a good visual coverage of the area quite quickly, whilst keeping costs down. As there is very little moving water on the site, the risk of plant wash-out is low. However, if there is a prolonged dry spell immediately after planting, additional water may need to be applied to avoid excessive plant losses. Planting should take place in the late spring/ early summer to give plants the best opportunity to establish before harsher winter conditions return. Ideally, plant supplies should be bought as locally as possible to ensure that plants are acclimatised to conditions in northeast Scotland.

The buffer and re-sown grassland areas can be planted with seed mixes containing the species listed above. However, this should be sown at a sufficient density to compensate for any likely losses from birds entering the area and eating the seed.

6.2.2 Costings

Wetland plants can be more difficult to obtain than standard bedding plants. A cost per plant has been obtained from Salix and River Wetland Services Ltd, the UK's largest supplier of wetland plants,

and this has been used as the basis of the costings (see Table 10). Any plant supplier is likely to need a lead-in time to be able to produce sufficient numbers of these plants. Based on experience at the East Tullos Burn in Aberdeen a cost of £0.25 per plant for planting labour is considered appropriate. A detailed breakdown of planting costs is given in **Appendix F.**

Table 10. Estimated plant and labour costs.

Planting Area	Area (m2)	Specification	Total Cost (ex VAT)
Emergent / fringing wetland species	805	at 5 plants per m^2	£2,536
Wetland species	7440	at 5 plants per m^2	£23,436
Buffer area – seed	9380	at 2g per m^2	£1,388
Re-sowing sports pitch area	500	At 25g per m^2	£187
Plant delivery costs		£70 per 2000 plants	£1,443
Total			**£28,990**

6.3 ENHANCING THE VISITOR EXPERIENCE

The public consultation highlighted that people are keen to be able to enjoy the wetland area as an integral part of a visit to the park. Therefore, opportunities were sought to enhance the visitor experience, as part of the wetland development whilst minimising potential impact on wildlife. This can be done through providing viewing areas and repairing damaged paths.

6.3.1 Viewing areas

The criteria used for selecting viewing areas are based on ease of access, quality of the viewing experience and the potential for wildlife disturbance.

Along the southern boundary (by St Machar Cathedral) the path is uneven and there is a steep embankment with mature trees. It would be impractical to place a viewing area along this section as overhanging branches would prevent a clear view of the wetland and the slope is too steep to allow reasonable access.

The ‘pill box’ cannot easily be reached from above and its structural integrity is unknown. However, this has been discounted as a viable opportunity for conversion to a viewing hide.

A viewing area on the western side of the wetland (near the car park) would be easily accessible but difficult to screen, making it more likely for wildlife to be disturbed by visitors using the hide or other people nearby.

This leaves the start/ end of the southern boundary path, near the vehicle entrance and the roadside section of the wetland as potential sites for viewing areas that will result in minimal additional disturbance and where there is good access.

Two options have been considered, taking on board the feedback from the public consultation; an opportunity to get close to the water and to view wildlife. Other suggestions relating to the educational value of access to the water have been discounted due to the health implications of people ‘pond dipping’ where the water is potentially contaminated from the septic tank outlet.

6.3.2 Getting close to the water

Giving people a safe opportunity to be surrounded by water can be achieved with a combination of a raised causeway and a platform with balustrade. This would provide access for all abilities, including families with pushchairs / buggies and wheelchair users. A raised causeway with gently sloping sides will provide a dry route out to the platform and a permeable surface (cellular plastic grid) is recommended. The approximate location and a visualisation of the proposed platform are shown in Figure 13. Consideration has been given to the excavation requirements of the wetland area, to ensure that the viewing platform lies adjacent to the deepest part of the wetland. This gives the highest chance of there being open water in front of the platform. However, as the site is a wetland, rather than a pond, water levels will fluctuate to some extent. The only way in which water levels could be guaranteed year round would be to install a more formal 'pond' system, with water level management.

Figure 13. Viewing platform location and visualisation.

This design provides an opportunity to integrate interpretation within the viewing platform relating to the wildlife likely to be seen in the wetland, rather than requiring additional structures.

Access to the platform is parallel to the road, via a mown grass path raised above the current level to ensure that it is accessible year round. There is an existing low barrier next to the road to discourage people from using the road, but a higher barrier could be installed next to the platform if there were additional safety concerns.

6.3.2.1 Platform specification details

The outline specification drawing (Figure 14) gives minimum dimensions and layout of the platform but does not include construction detail. It is recommended that the platform be constructed from recycled plastic to minimise maintenance requirements and reduce the vandalism risk of fire. The platform must be built to deal with 'crowd loading' as it is likely that the space will be popular and may be full at times. The surface must have a non-slip finish. A wooden surface must have non-slip strips attached; wire mesh is not an acceptable solution and grooved wooden decking would require periodic cleaning.

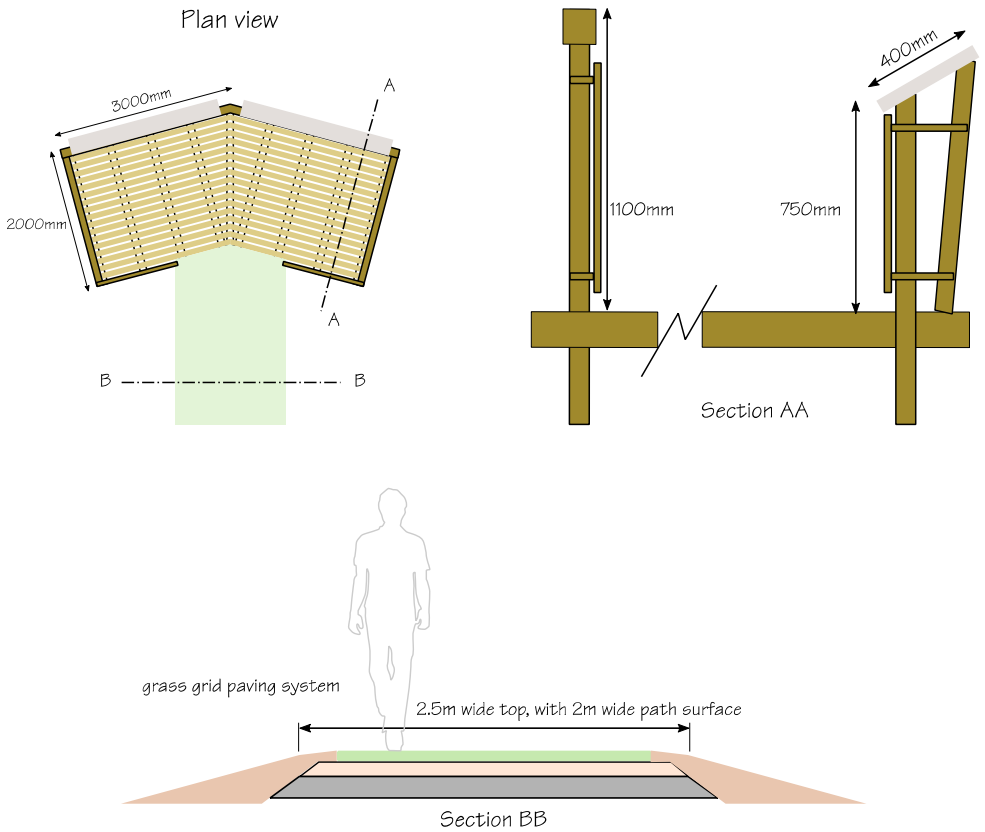
The balustrade must conform to building regulations (see Chapter 4 of the Technical Handbook, non-domestic buildings safety) and therefore needs to be 1100 mm high except where it is greater than

250 mm wide at the top. Any gaps in the balustrade must not allow a 100 mm sphere to pass through, and should not be easy to climb. Therefore the balustrade can be 750 mm high along the front edge, incorporating an angled interpretation panel and with 50 mm wide uprights, spaced at 140 mm centres. The side and rear sections of the balustrade should be 1100 mm high with a top rail.

The approach causeway should be a minimum 2 m wide path, with a slope of less than 2% in any direction. There should be no change in level between the causeway and the platform and the sides of the causeway should be graded at 20%, with a level path margin of 250 mm each side.

If water quality issues can be addressed, there may be demand to use the platform for pond-dipping activities, although if the platform becomes popular for feeding wildfowl, it may not be ideal for both activities. Pond-dipping is most interesting where there is relatively shallow water and undisturbed substrate. The balustrade design complies with building standards but is not conducive to access to the water – for obvious safety reasons, and it is not recommended to construct a pond-dipping platform with no balustrade in such a busy location in a public park. However, it may be possible to adapt the side balustrade to have a removable top section (secured by a locking mechanism) without compromising the structural integrity of the platform. This would provide an opportunity for small groups to participate in pond-dipping, under supervision, when the water levels are appropriate.

Figure 14. Outline specification of viewing platform.



6.3.3 Overseeing the wetland

Although it is not recommended to install a wildlife viewing hide for practical and safety reasons, a raised viewing area at the western end of the park could be constructed to allow an elevated view of the wetland. This area would be easily accessible for families with pushchairs/ buggies, and wheelchair users.

The viewing area could comprise a flat area approximately 6 m long x 2 m wide with a balustrade and two access paths. The surface is recommended as an unbound aggregate with particle size of less than 10 mm, on a 150 mm thick sub-base of type 1 equivalent aggregate. A retaining wall will be required to ensure that there is no subsidence, constructed from 200 mm blocks and faced with local stone. A small number of immature beech trees need to be felled and grubbed out to open up the view.

The balustrade needs to be 1100 mm high with 50 mm wide uprights, spaced at 140 mm centres. An alternative, lower, balustrade could be used with a similar design to the front of the viewing platform.

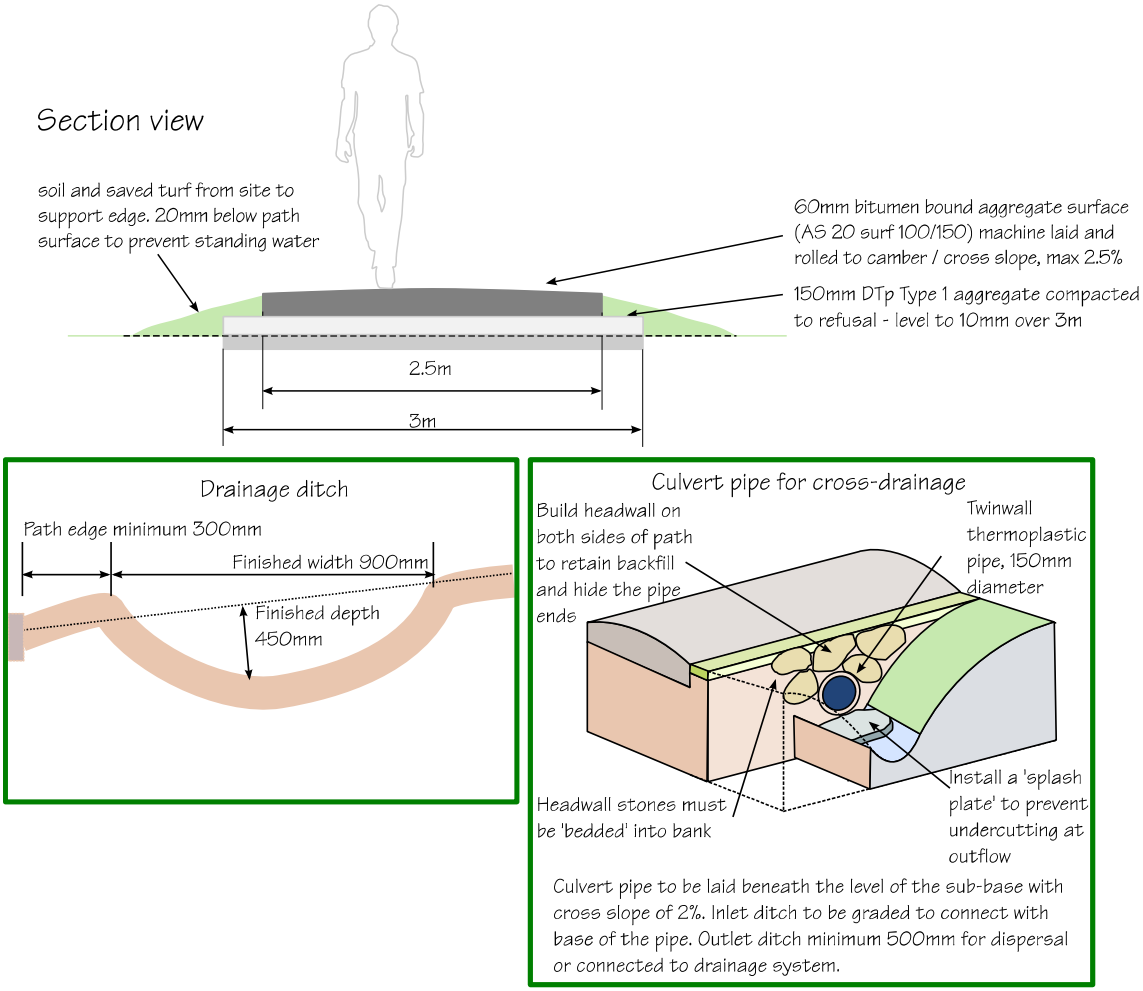
6.3.4 Path repairs

Approximately 90 m of path were under water at the time of survey and the condition of all of this could not be confirmed. However vehicle damage was evident in the shallow water and it is recommended to replace the whole section, with new drainage to intercept the seepage from the slope (see Figure 15). Additional drainage with new culverts beneath the path is recommended to protect the length of the path and reduce the flood risk. The drainage from the slope should be linked to the existing field drains beneath the rugby pitch. Offset screens should be installed at pipe entrances (e.g. culverts) to reduce the risk of blockage by debris such as autumn leaves.

Figure 15. Location and extent of path repairs.

The path repairs should be 'tied' to the existing path and constructed on top of the existing path, rather than excavating to retain the current path level. The connection 'ramps' with the existing path should have less than 5% slope, and the new surface should have a water shedding camber. An outline specification of the paths and culverts is provided in Figure .

Figure 16. Path specifications.



6.3.5 COSTS FOR ENHANCING THE VISTOR EXPERIENCE

Cost estimates in Table 11 are based on expert knowledge of current industry prices but reflect the limited size of the potential contract.

Table 11. Visitor experience cost estimates.

Structure	Item	Cost (ex VAT)
Viewing platform	materials	£2,500
	installation	£1,000
	Causeway	£1,500
	professional fees, including structural engineer	£1,100
Viewing area	base and balustrade	£3,200
	connecting paths	£1,000
	professional fees	£400
Path repairs	construction	£9,500
	drainage	£2,800
	professional fees	£1,200
Total		**£24,200**

6.4 CONSTRUCTION METHOD STATEMENT

It is assumed that prior to any construction the elements of the design will have been staked out on site to guide the construction. It is essential that this occurs in order to ensure that the design is accurately reproduced. It also assumed that construction crews will have copies of the design drawings on hand for reference at all times.

For the purposes of this construction methodology, different stages of the design will be referred to as:

1. Wetland Excavation
2. Augmented Elevation Area
3. Ditch and Reprofiling
4. Swale Excavation
5. Wetland Planting
6. Construction of informal paths

Stage 1 and 2 are envisaged to occur effectively simultaneously, with the three distinct wetland depressions being excavated with the spoil forming the augmented elevation in the centre of the design. As it is anticipated that the ground during excavation will be close to saturation it is advisable to start with the wetland depression to the south of the design and construct a temporary ditch connecting all excavated areas with the ditch to the south east to enable water to escape during construction. It is strongly advised that adequate silt traps are installed in the existing ditch prior to construction.

Next, stage 3 will involve initial reprofiling of the western bank of the ditch adjacent to the wetland design area. Once this is complete, the two connecting swales, can be excavated (stage 4). During stages 1, 2, 3 and 4, all excess spoil is to be bulk handled to a storage area for use in raise mown grass pathways (Stage 6). Once all the primary design areas (Stages 1 - 4) are complete, the planting of emergent vegetation and wetland plants can take place (Stage 5). Following planting, the temporary drainage ditch is to be refilled to complete the intended design. Seeding of the buffer/ meadow area should take place as part of the reinstatement works following stage 6.

Correct implementation of the designs in terms of specific design elevations and horizontal locations is key to their success and sustainability; we assume that the designs can be built to a tolerance of 50 mm. Finally, cbec recommends erecting temporary fencing around newly planted wetland areas, to reduce the risk of damage by birds and deer. If the area is not fenced off while the plants become firmly rooted, replanting at a later date is likely.

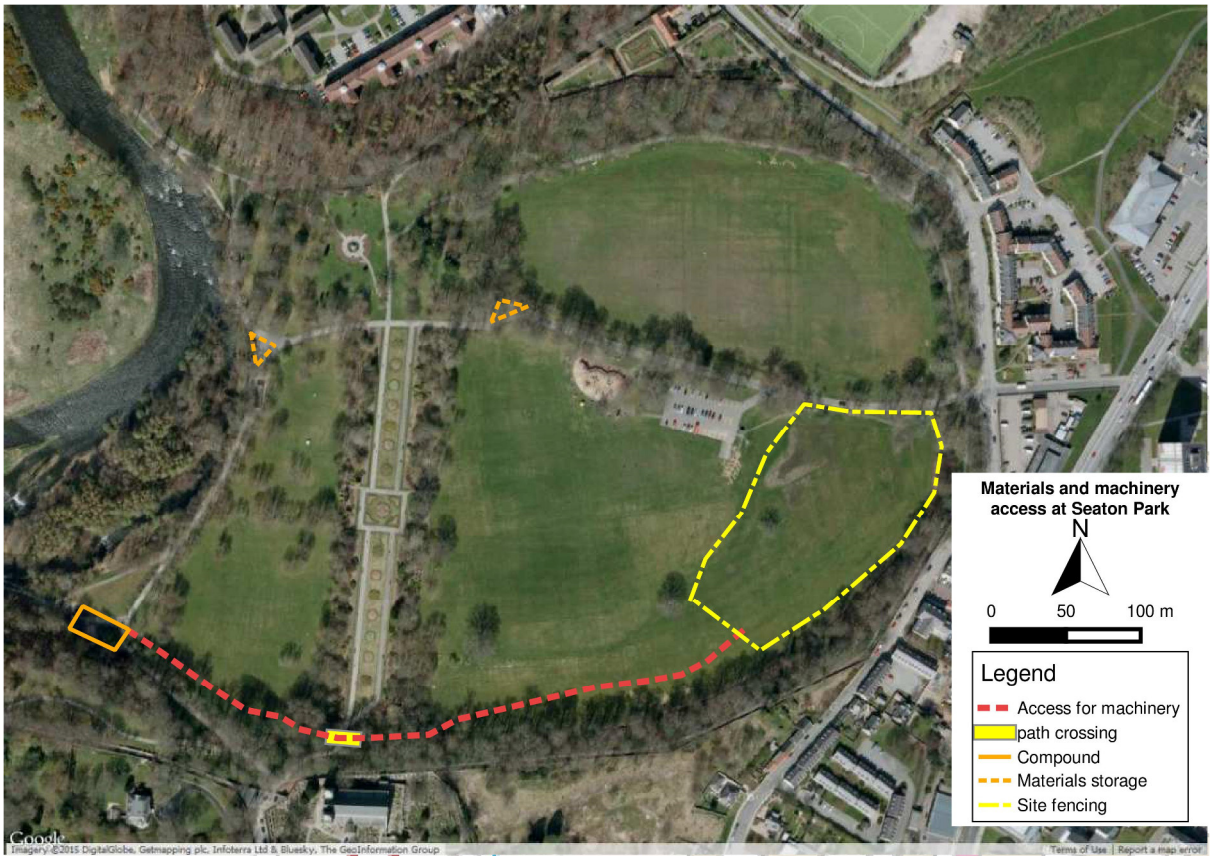
6.5 SITE MANAGEMENT AND SECURITY

There is potential for anti-social behaviour and vandalism of machinery used on site and therefore a secure compound will be required. Storage of materials (e.g. aggregate for path construction) needs to be safe during public use of the park and all work sites will need to be left in a safe condition when unattended.

A boundary fence for the wetland area will be required during the construction phase so keep members of the public safe during excavation operations (see Figure 17).

The machinery-tracking route from the compound to the work site crosses a main path within the path, which needs to be protected from metal tracks. Boards must be placed across the path, with ramps to facilitate wheeled access along the path line. The path must be closed during machinery manoeuvres using temporary barriers.

Figure 17. Suggested location of work compound and machinery access.



A compound could be located within or adjacent to the car park. However, use of the car park may have a detrimental effect on visitors, through loss of parking space, and may cause additional ground damage in a prominent location through tracking of vehicles. Expansion of the site fencing to include a compound would be an alternative.

6.6 CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2015

The revised Construction (Design and Management) Regulations 2015 (CDM2015) came into force in April 2015 and govern how projects are safely planned, managed and implemented, irrespective of the size, value or duration of the work. Under CDM2015, Aberdeen City Council would be recognised as the client and therefore has specific duties to ensure that the project is implemented safely and within the law:

- Check competence and resources of all appointees
- Ensure there are suitable management arrangements for the project including welfare facilities
- Allow sufficient time and resources for all stages
- Provide pre-construction information to designers and contractors

cbec has the role of CDM Designer, and has the following duties:

- Check client is aware of their duties
- Eliminate hazards and reduce risks during design
- Provide information about remaining risks

cbec has produced designs that minimise the risk to contractors and the public within the reasonable limits of this contract. The designs take into account the potential use of the area post-construction and planting plans have been designed to discourage the public from accessing open water. A competent contractor should be able to identify all potential hazards prior to the construction phase and cbec is not aware of any concealed hazards except the storm drains, that the client should pass on to a contractor.

It is unlikely that this project would need to be notified to HSE under the revised regulations but if more than one contractor is likely to be involved with the implementation phase, a 'principal designer' must be appointed (which replaces the previous CDM Coordinator role).

The Principal Designer's role would be to:

- Plan, manage, monitor and coordinate health and safety in the pre-construction phase of a project. This includes:
    - identifying, eliminating or controlling foreseeable risks;
    - ensuring designers carry out their duties;
- Prepare and provide relevant information to other dutyholders;
- Liaise with the principal contractor to help in the planning, management, monitoring and coordination of the construction phase.

6.7 SUMMARY OF CONSTRUCTION COSTS

A summary of the costs (exclusive of VAT) of the various elements of the construction process are:

Earthwork Costs	£8,128
Construction project management and setting-out of design[1]	£5,500
Drainage system costs	£22,700
Planting costs (plants and labour)	£28,990
Enhancing the visitor experience costs (viewing platform/ area, paths)	£24,200
Estimated total cost	**£89,518**

[1] Including design construction supervision.

7 METHODOLOGY OF ENGINEERING DESIGNS

Field surveyed topography was rendered within Autodesk Civil 3D 2013 (Civil 3D) to produce a DEM surface that accurately represents the existing ground conditions (Figure 10). Wetland enhancement features were positioned with reference to depressions in the existing ground surface and excavation depths were defined to produce a depth of standing water no greater than 0.75 m under typical maximal winter extent conditions (indexed to that surveyed in January 2015).

Once the elevation and lateral limits of all of the design features were established in Civil 3D, the software's 'Grade to Surface' function was used to connect the lateral limits of the design surfaces to the existing ground.

The above Civil 3D processes resulted in final design surfaces. To establish the volume of materials that would need to be excavated, reused in the designs, or require disposal elsewhere, the existing ground surface and the design surfaces were compared in Civil 3D by creation of a TIN Volume Surface.

Engineering drawings were created in Civil 3D to give a precise and accurate representation of the designs. These drawings include scaled plan views of the designs showing the horizontal positioning of all design elements (see Figure 18). Also included are four scaled cross sections that were extracted at critical design locations to inform the vertical dimensions of the design, and their relationship to the existing ground (see Figure 19 and Figure 20). Details of specific design elements such as the raised pathway to the south-west of the site are included within the design drawings.

Figure 18. Seaton Park wetland design plan.

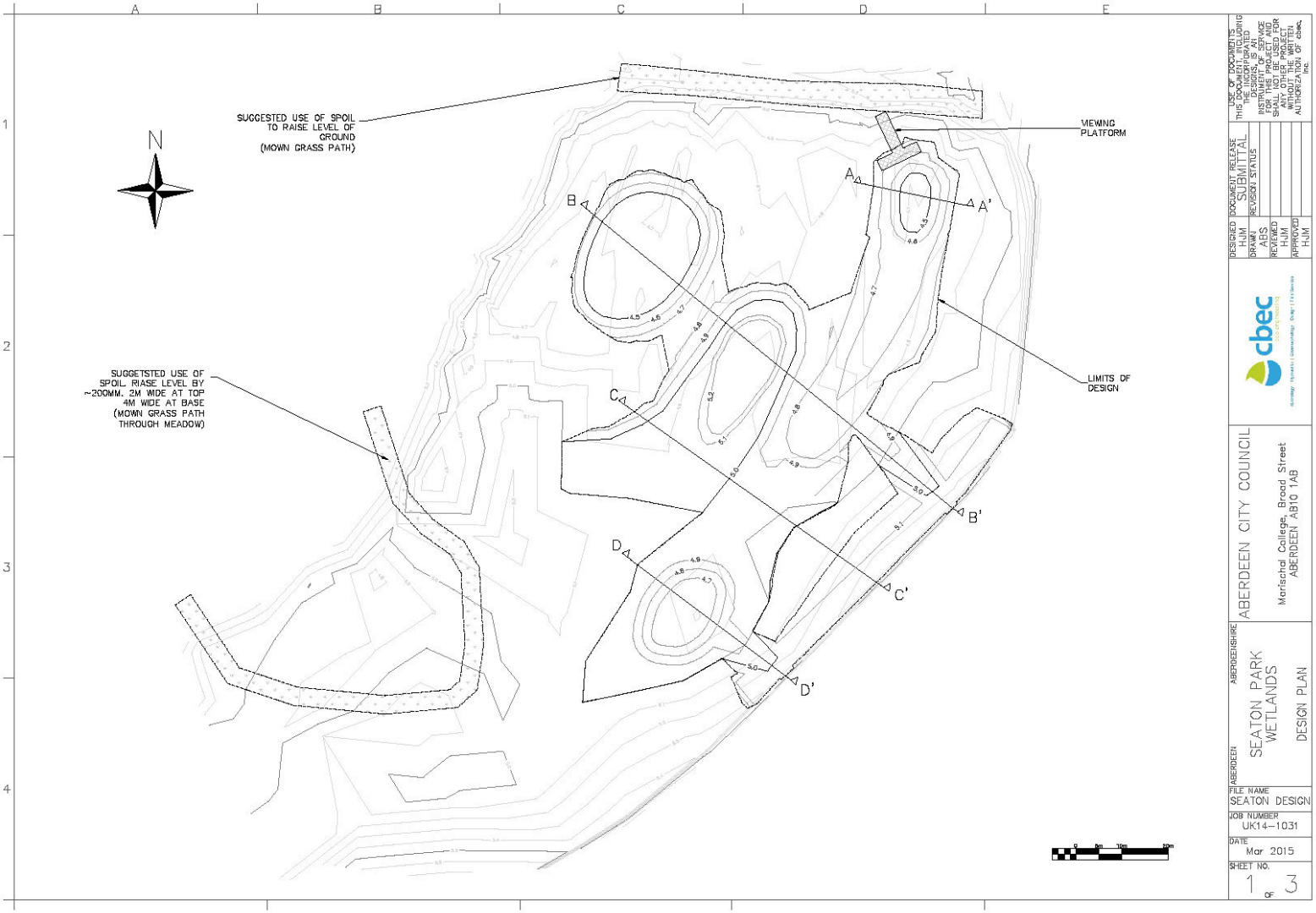


Figure 19. Seaton Park wetland sections A & B.

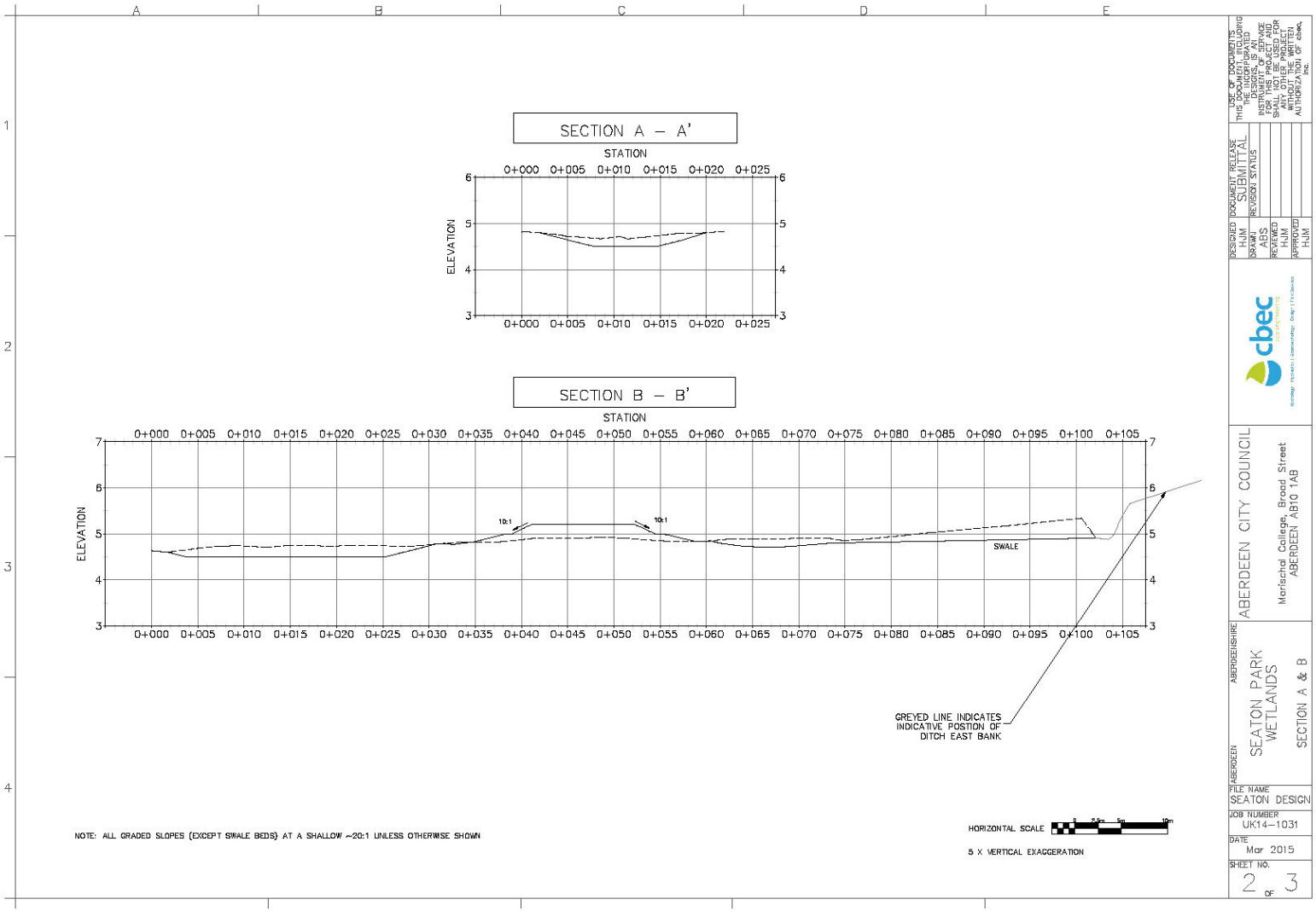
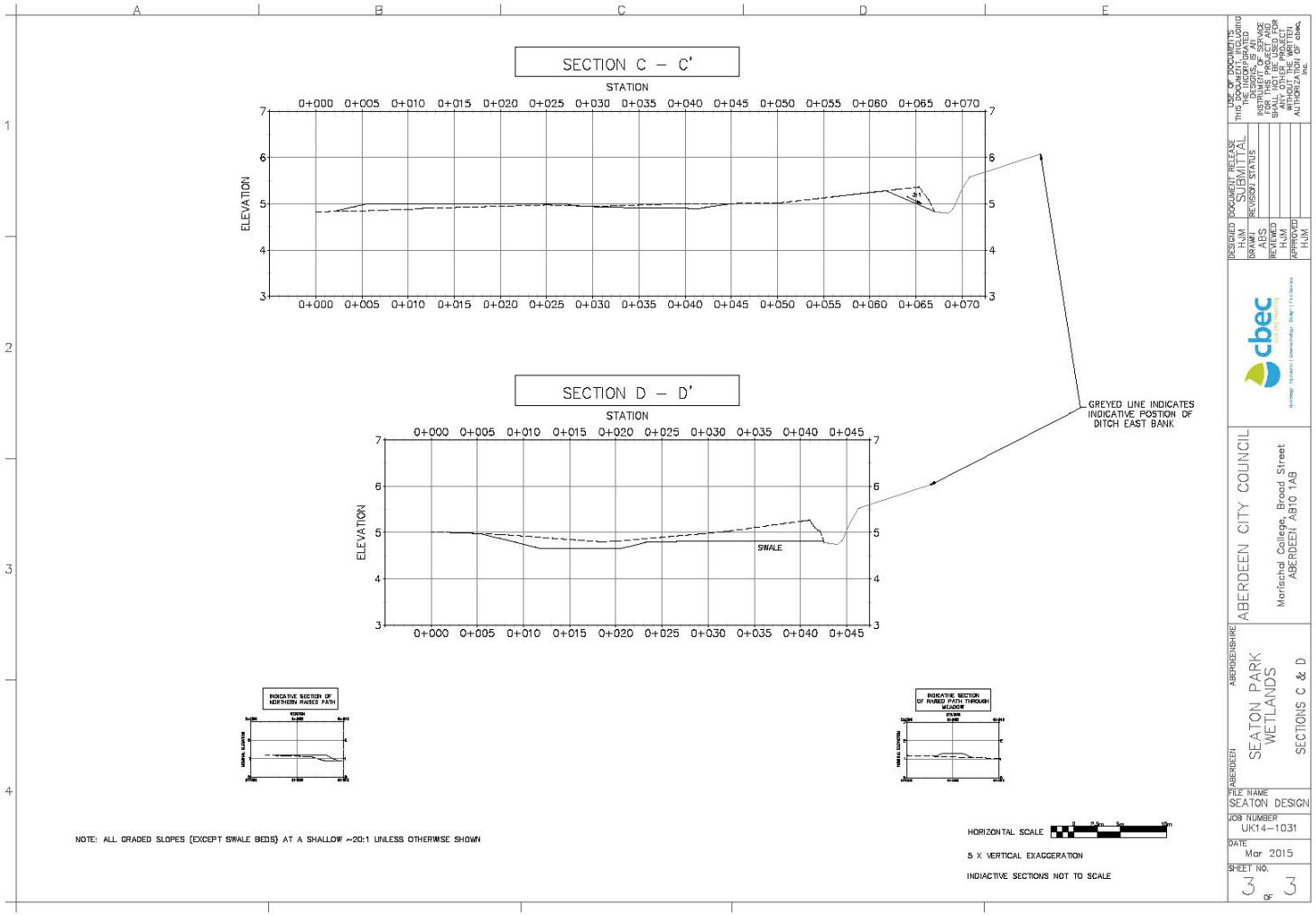


Figure 20. Seaton Park wetland sections C & D.



8 MANAGEMENT PLAN

In order to maintain the wetland as a positive feature within Seaton Park, it will require some ongoing management. The key requirements for management are set out below:

8.1 VEGETATION

8.1.1 Emergent wetland vegetation

This vegetation should not require to be cut on an annual basis and leaving the dense plant stalks at the end of the summer will help to maintain a soft landscaping barrier to discourage entry to deeper areas of water. The central water areas will not be planted up, but there is a risk that over time the emergent plants will start to spread into the open water. Growth of the emergent plants should therefore be reviewed every five years to establish whether or not cutting and removal of reeds is required in order to maintain an area of open water. If it is required, emergent plants should be cut back below water level and the cuttings removed from the site.

8.1.2 Wetland And Buffer Areas

The wetland and buffer areas should be cut with a strimmer on an annual basis and the cuttings removed. This will help to remove nutrients from the site and should allow a more diverse flora to develop over time. Cutting should take place in late summer, after plants have had an opportunity to set seed.

8.2 DRAINAGE

Drains within the northern section of the park will require maintenance on an annual basis. Without this maintenance, they are likely to block up and the flooded area will return.

8.3 PUBLIC ACCESS

The standard maintenance of park facilities will be required; this is unlikely to be more maintenance than currently implemented. However, built features such as the viewing platform need to have a regular inspection regime to ensure that they remain safe for their intended use.

9 PRE- AND POST-WORKS CONSIDERATIONS

Before work can begin implementing the proposed design, there are several considerations.

9.1 WATER QUALITY ISSUES AND SEPTIC TANK DRAINAGE

Some assessment of water quality should be made, given the unexpected discovery of the septic tank system. Ideally, consideration should also be given to connecting the public toilet to the mains drainage system, which will remove this risk to water quality entirely. Given the park's proximity to an urban area, this may not be too costly, although there will be an on-going charge from Scottish Water. However, given that the septic tank clearly needs to be emptied frequently, there may be a net saving to the Council in the longer term.

9.2 EARTHWORKS

Based on the contaminated land assessment, cbec does not believe sediment will require transport off-site. However, further analysis of this issue is required to confirm this. If sediment does require removal for health and safety reasons, this will significantly alter the costings. Furthermore, as detailed in Section 6.1.1, some limited ground investigation works may be advisable to ensure that the soils/ sediments at the site are appropriate for the proposed design.

9.3 WORKS PERMISSIONS

Research into relevant planning and works permissions was beyond the scope of this project. This aspect should be investigated by Aberdeen City Council. As the planning authority, it would be appropriate for Aberdeen City Council to seek planning permission for the project, in order to demonstrate best practice.

Authorisation for the works should not be required under the Water Environment (Controlled Activities) (Scotland) Regulations 2011. The works would fall under the engineering regime, but this regime specifically excludes "works in inland wetlands, where the wetland is not directly associated with a river, loch or artificial water body". However, this should be confirmed with SEPA.

9.4 TIMING

These works should commence in the late spring or early summer, when water levels are reduced. This will provide the plants with a full growing season to establish, but will avoid doing too much damage to water-soaked ground. It should be noted that the Friends of Seaton Park hope to apply for Green Flag status in 2017 and ongoing construction work during this time has the potential to impact on their application.

9.5 PRE- AND POST-CONSTRUCTION MONITORING

Assessment of the effectiveness of the implemented design and the prescription of any 'adaptive management' measures will require quantitative assessment of physical and ecological conditions within the wetland. cbec and Walking-The-Talk recommend a suite of monitoring methodologies to achieve this.

10 LIST OF PREPARERS

This report was prepared by cbec eco-engineering UK Ltd and Walking-the-Talk. The individuals listed below had key roles in the preparation and content of this document.

Project Management, Design Option Development and Reporting

Dr Hamish Moir, cbec eco-engineering UK Ltd

Hydrological and Assessment Reporting

Austen-William Poll, cbec eco-engineering UK Ltd

Ground Surface Modelling, Design Drawings and Reporting

Andrew Bowden-Smith, cbec eco-engineering UK Ltd

Public Consultation and Planting Scheme Development

Tamsin Morris, Walking-the-Talk

Enhancing the visitor experience

Chris York, Walking-the-Talk

Conceptual Design Development

Ben Parry

11 REFERENCES

Aberdeen City Council. (2014). *Invitation to Quote for the provision of Seaton Wetland Project Scoping Study.* Aberdeen City Council, Aberdeen.

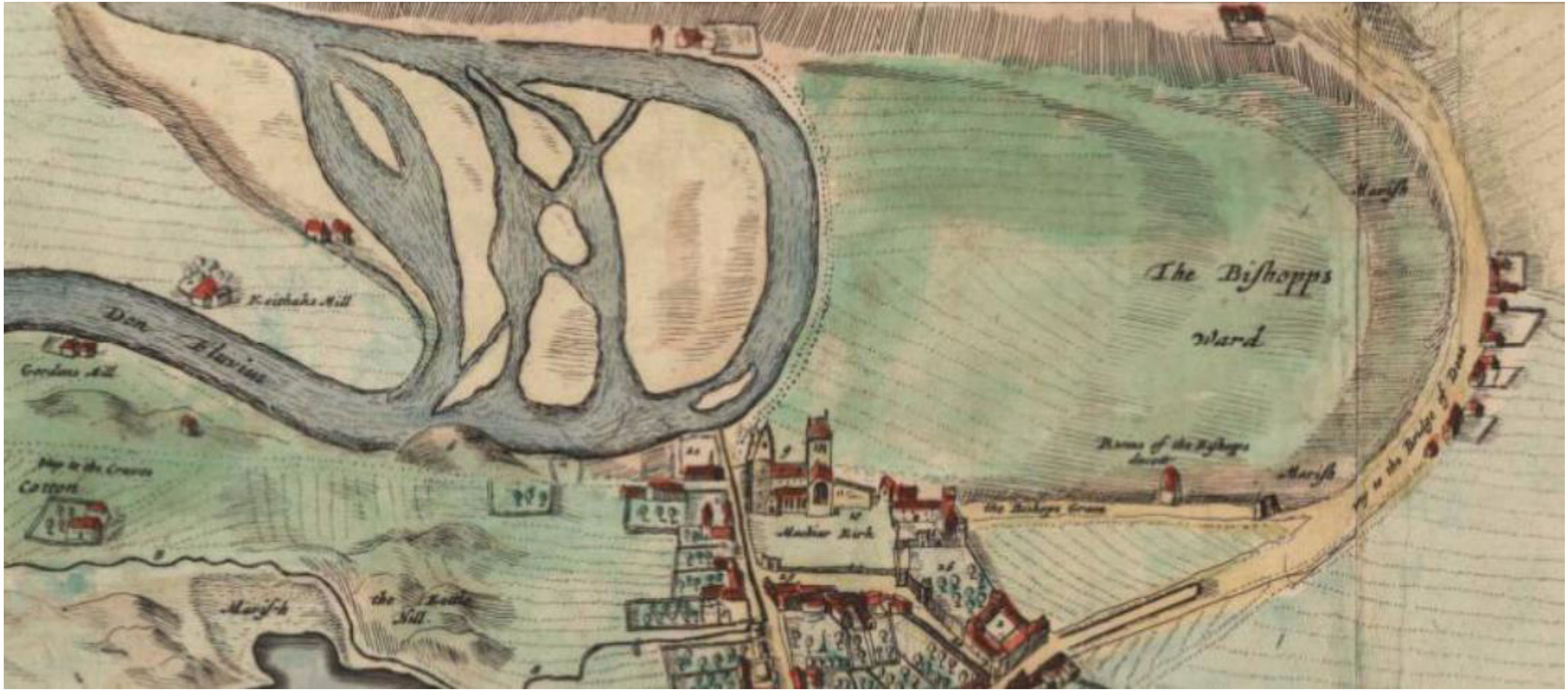
Babtie Group (now Jacobs), *River Don Flood Event of 8-12 September 1995, Flood extent & Floodplain Maps*, October 1995.

JBA Consulting, Don and Berwichshire; Post-Flood Survey River Don Photographic Record December, Decmber, 2002.

National Library of Scotland, historical maps of Seaton Park. Retrieved January 2015: http://maps.nls.uk/view/74400885

APPENDIX A:

HISTORICAL MAPS

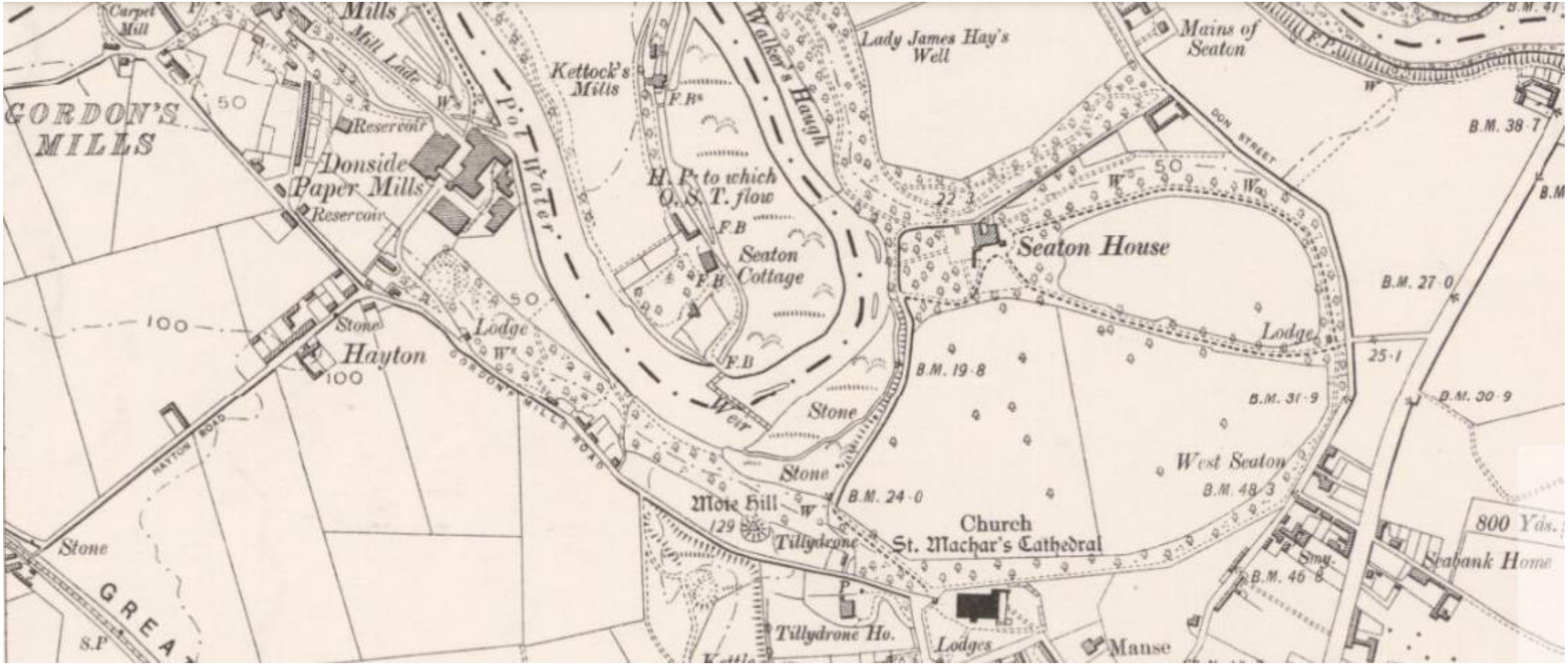


Section of 1661 James Gordon map

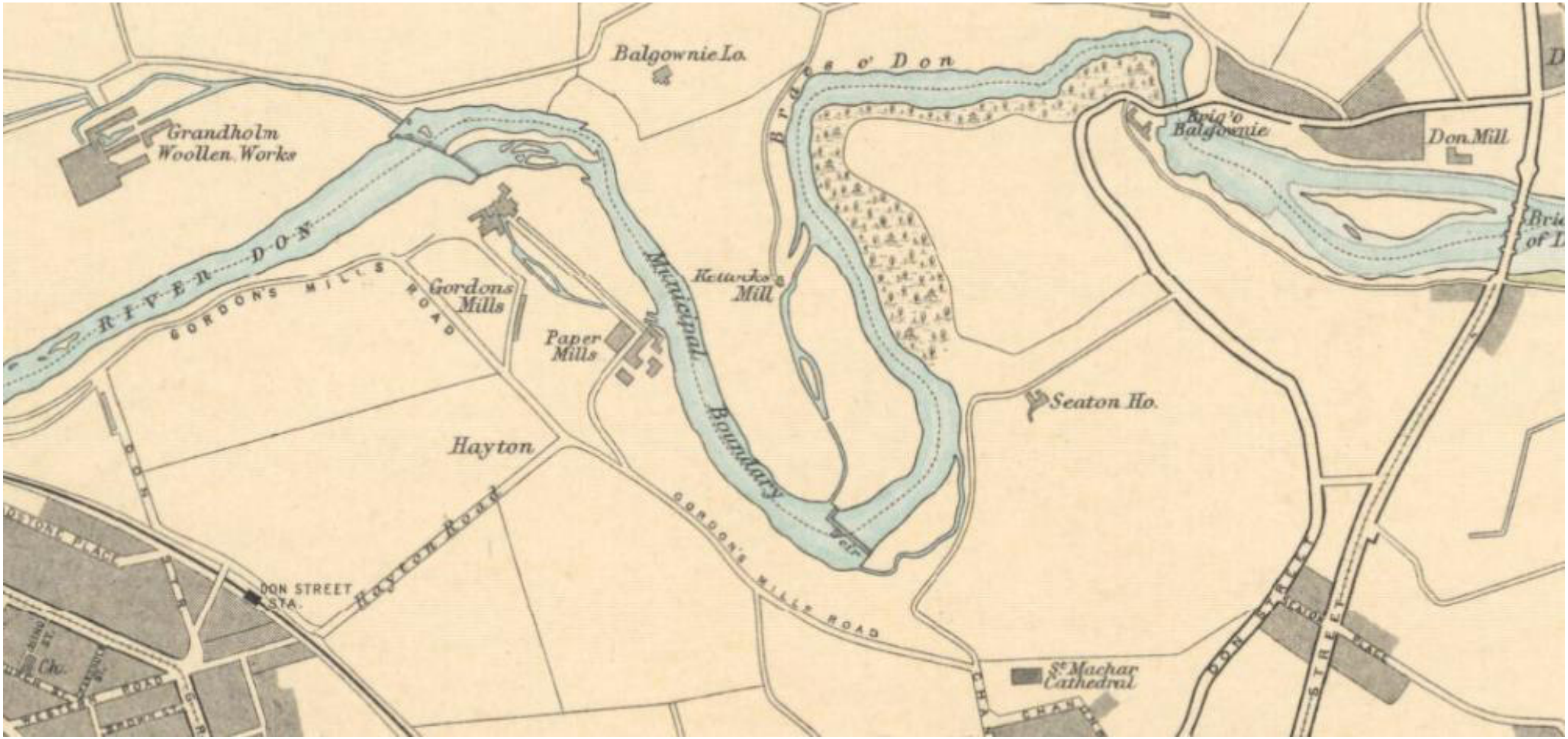
Section of ~1750 Roy Military map

Section of 1828 John Wood map

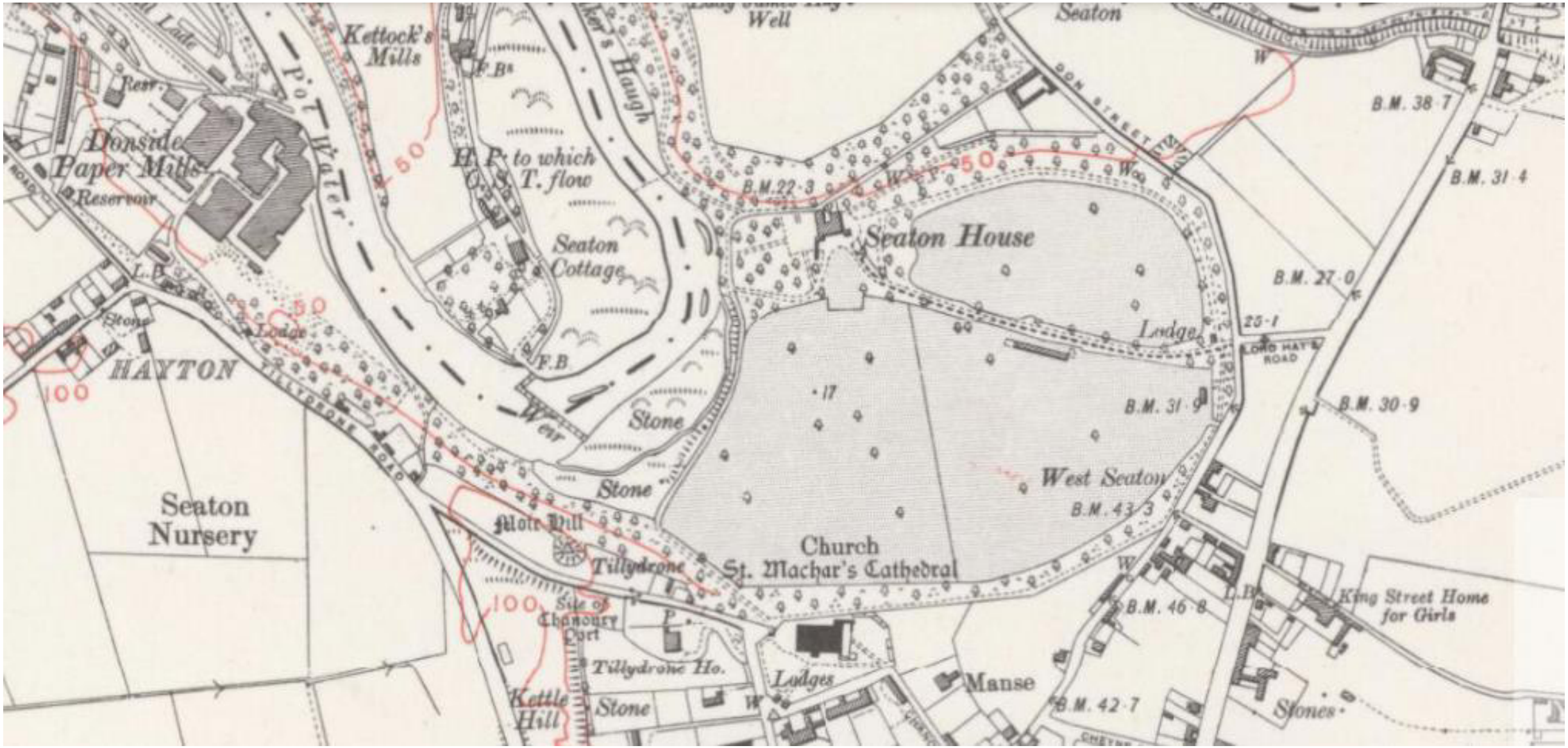
Section of 1869 1st Edition Ordnance Survey map



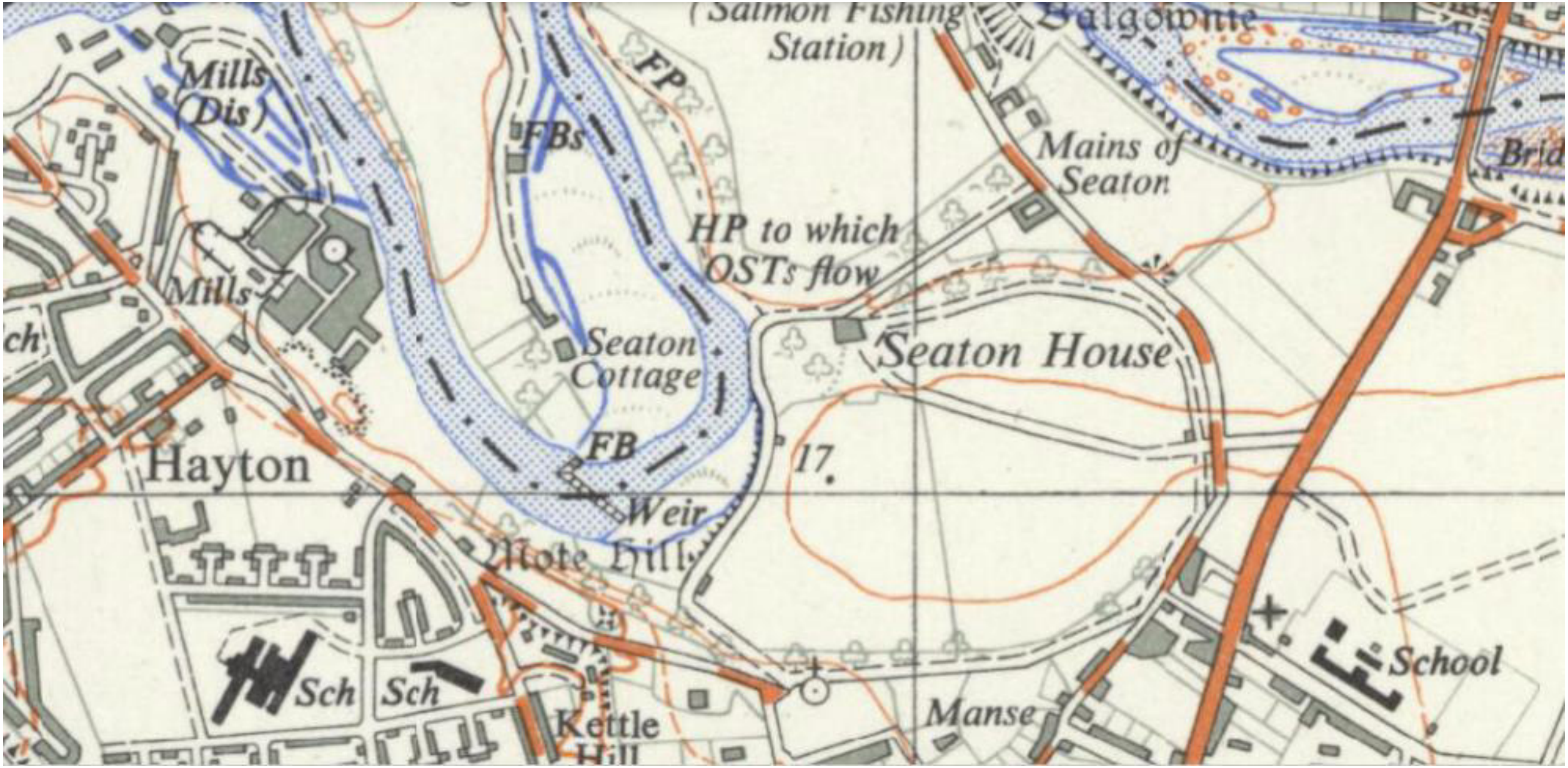
Section of 1902 2nd Edition Ordnance Survey map



Section of 1912 Bartholomew Survey Atlas of Scotland map



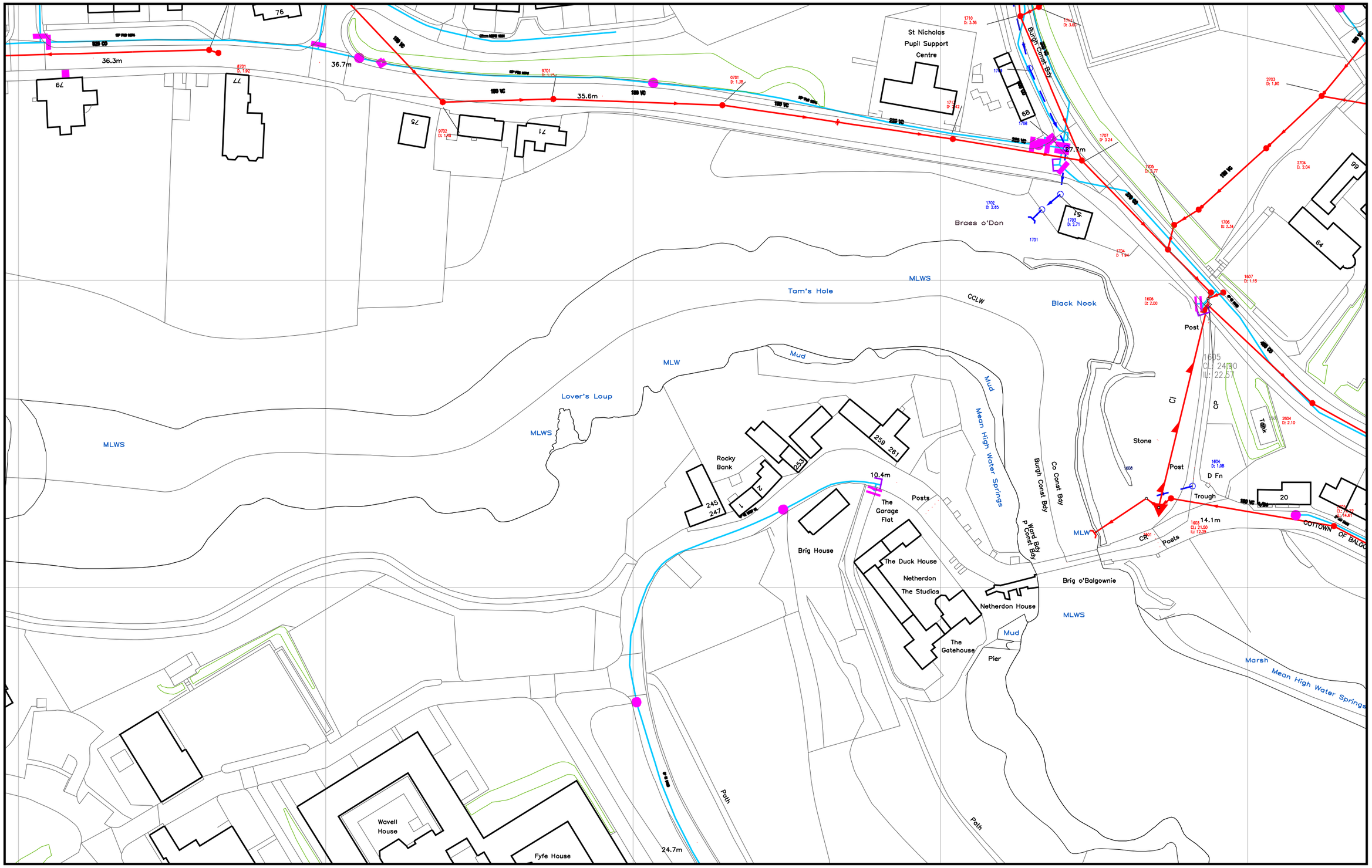
Section of 1928 6-inch Ordnance Survey map



Section of 1957 1:25,000 Series Ordnance Survey map

APPENDIX B:

AFFECTED SERVICES MAP



The representation of physical assets and the boundaries of areas in which Scottish Water and others have an interest does not necessarily imply their true positions. For further details contact the appropriate District Office.

Date Plotted: 26/01/2015

Seaton Park

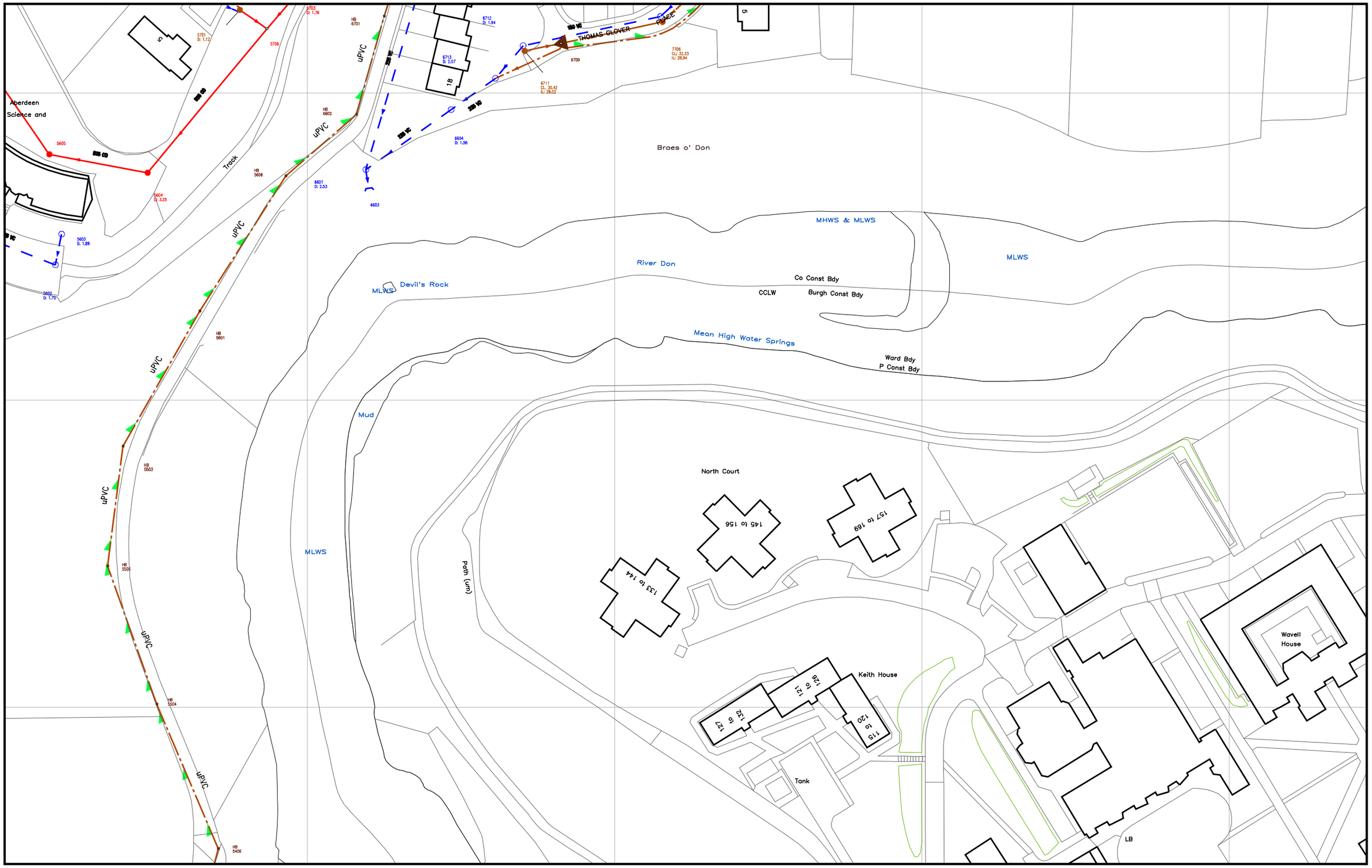
1

0 — 118 metres

Scale: 1:1250

Plotted By: abccab09

Scottish Water
Always serving Scotland
Castle House,
6 Castle Drive,
Dunfermline,
KY11 8GG
Tel No: 0845 601 8855



The representation of physical assets and the boundaries of areas in which Scottish Water and others have an interest does not necessarily imply their true positions. For further details contact the appropriate District Office.

Date Plotted: 26/01/2015

Seaton Park

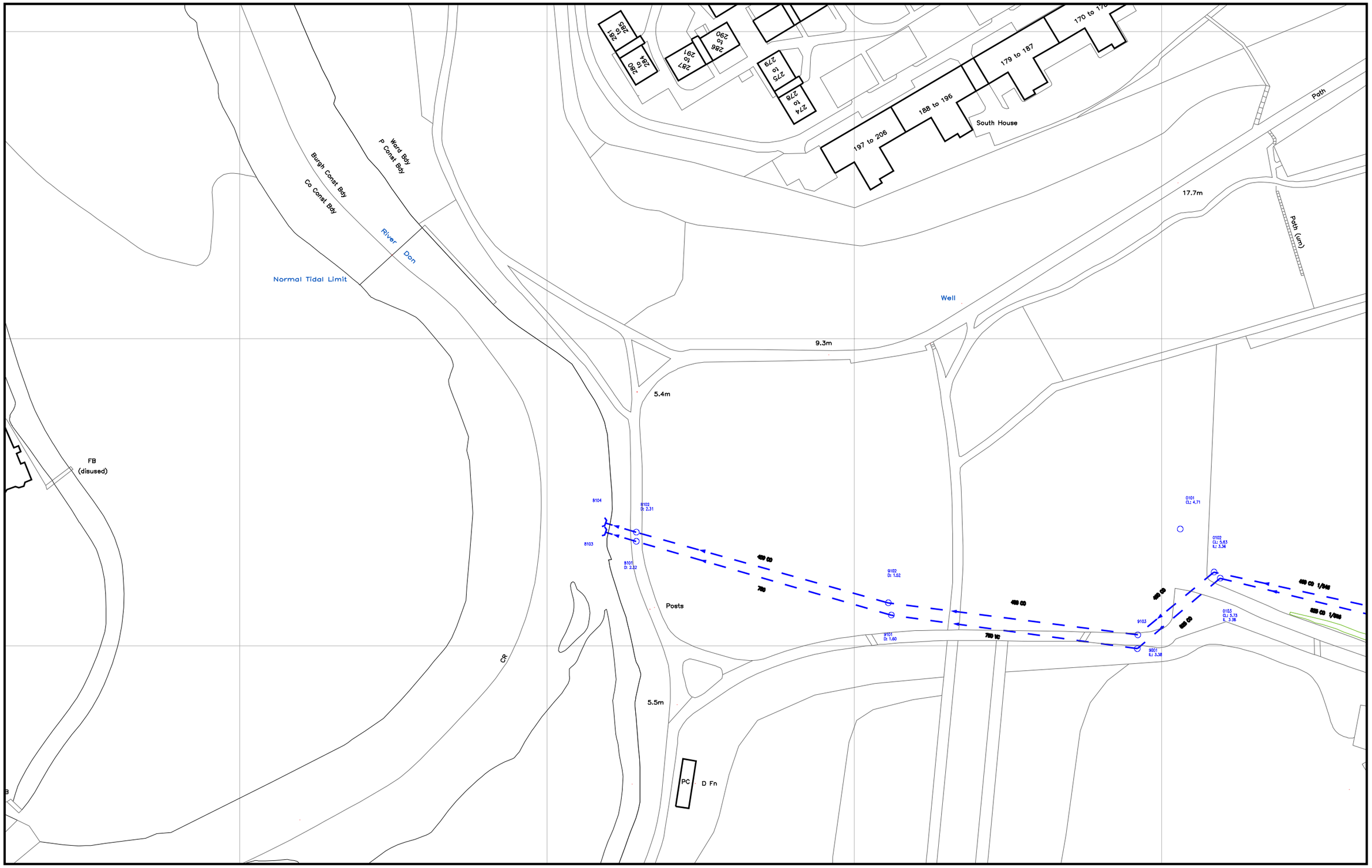
2

0 — 118 metres

Scale: 1:1250

Plotted By: abccab09

Scottish Water
Always serving Scotland
Castle House,
6 Castle Drive,
Dunfermline,
KY11 8GG
Tel No: 0845 601 8855



The representation of physical assets and the boundaries of areas in which Scottish Water and others have an interest does not necessarily imply their true positions. For further details contact the appropriate District Office.

Date Plotted: 26/01/2015

Seaton Park

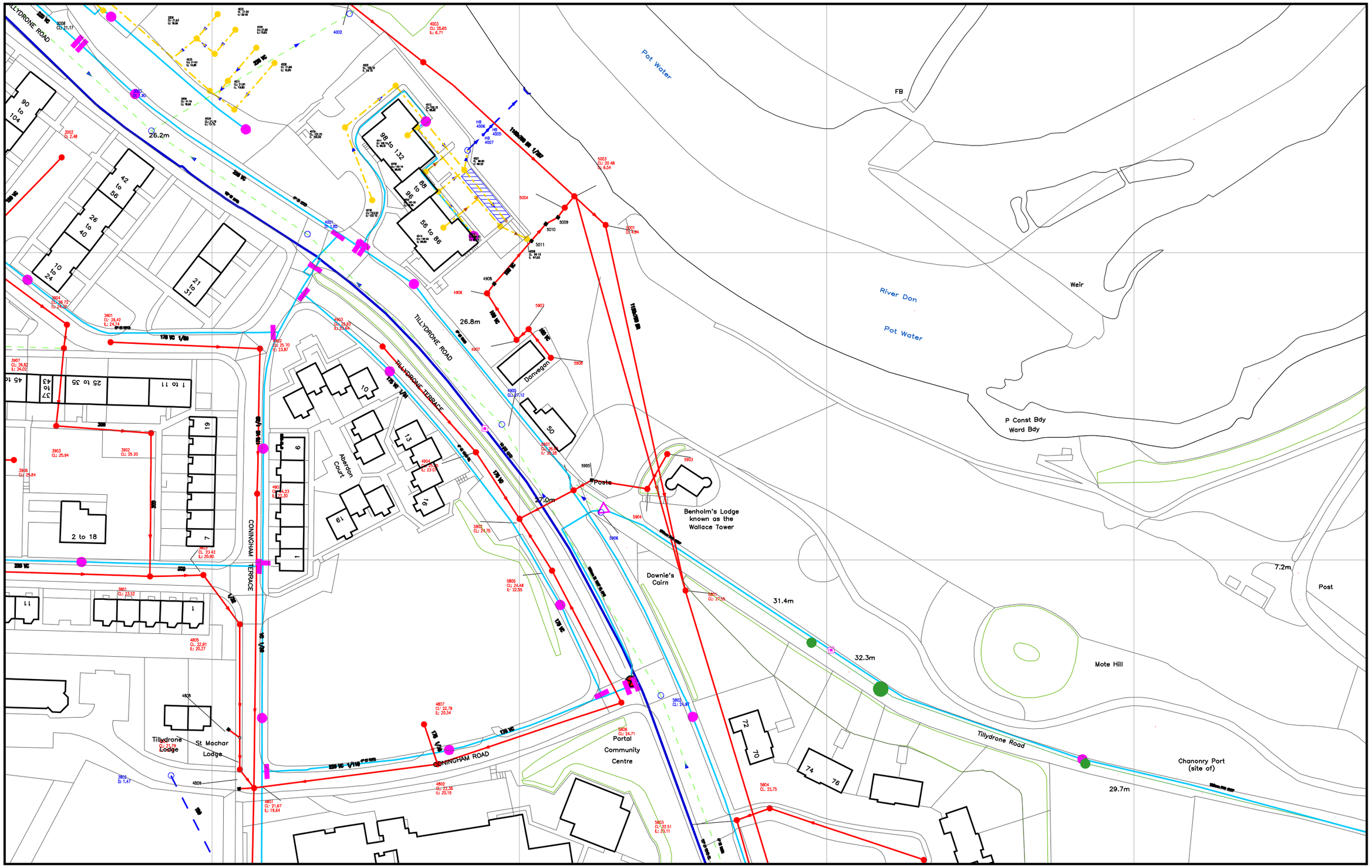
3

0 — 118 metres

Scale: 1:1250

Plotted By: abccab09

Scottish Water
Always serving Scotland
Castle House,
6 Castle Drive,
Dunfermline,
KY11 8GG
Tel No: 0845 601 8855



The representation of physical assets and the boundaries of areas in which Scottish Water and others have an interest does not necessarily imply their true positions. For further details contact the appropriate District Office.

Date Plotted: 26/01/2015

Seaton Park

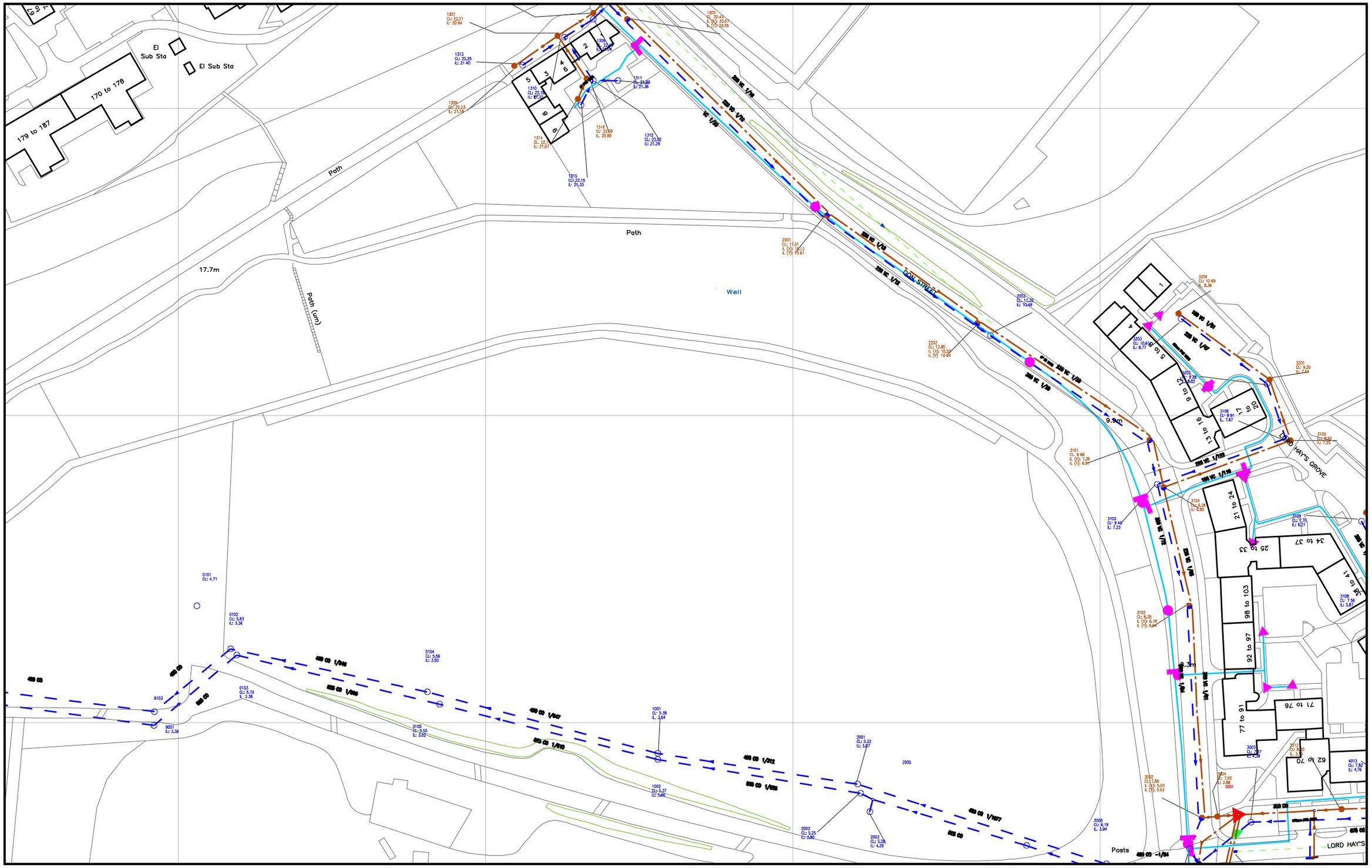
4

0 — 118 metres

Scale: 1:1250

Plotted By: abccab09

Scottish Water
Always serving Scotland
Castle House,
6 Castle Drive,
Dunfermline,
KY11 8GG
Tel No: 0845 601 8855



The representation of physical assets and the boundaries of areas in which Scottish Water and others have an interest does not necessarily imply their true positions. For further details contact the appropriate District Office.

Date Plotted: 26/01/2015

Seaton Park

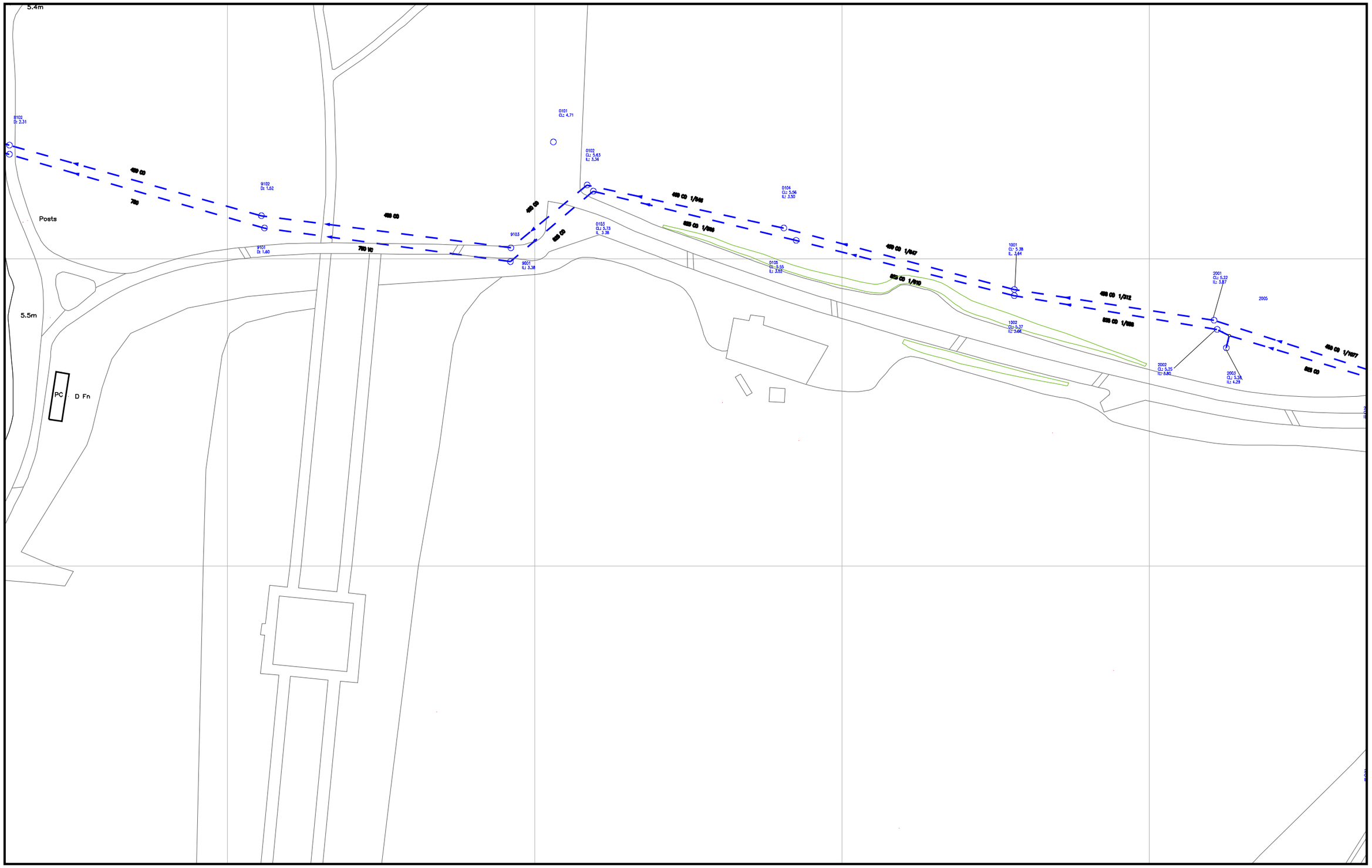
5

0 — 118 metres

Scale: 1:1250

Plotted By: abccab09

Scottish Water
Always serving Scotland
Castle House,
6 Castle Drive,
Dunfermline,
KY11 8GG
Tel No: 0845 601 8855



The representation of physical assets and the boundaries of areas in which Scottish Water and others have an interest does not necessarily imply their true positions. For further details contact the appropriate District Office.

Date Plotted: 26/01/2015

Seaton Park

6

0 — 118 metres

Scale: 1:1250

Plotted By: abccab09

Scottish Water
Always serving Scotland
Castle House,
6 Castle Drive,
Dunfermline,
KY11 8GG
Tel No: 0845 601 8855

Vodafone Network Colour:

- Ex-Cable&Wireless UK Network (now Vodafone)
- Planned & Approved Route
- Planned Route – Awaiting Approval
- Other Licensed Operator (OLO)
- Ex-Thus Network (now Vodafone)
- Ex-Energis Network (now Vodafone)
- OLO

Other:

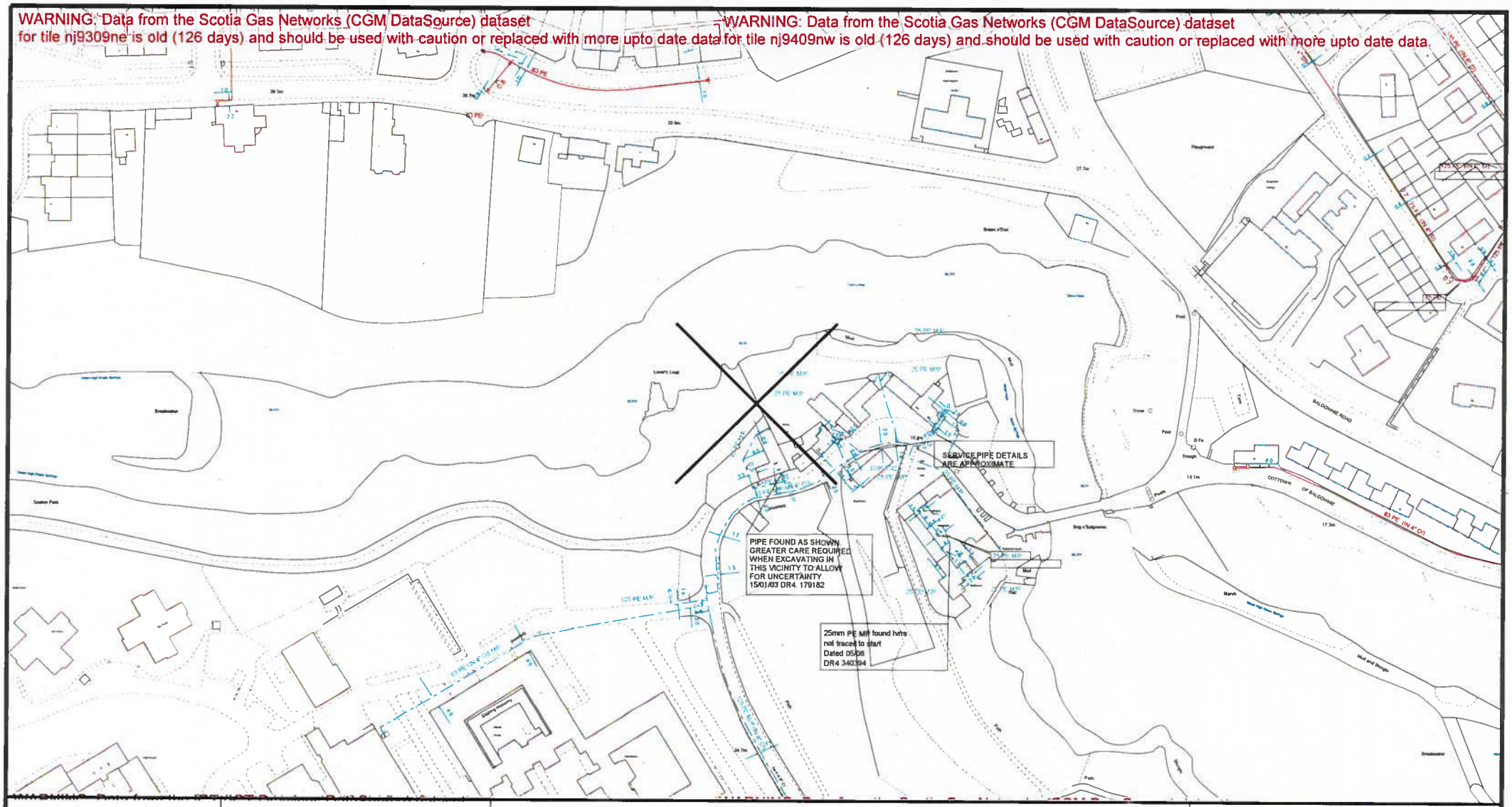
- Overhead Electricity Line (non Vodafone)
- Network Rail

Other Licensed Operator (OLO).

= Ex-Cable&Wireless UK, Energis and Thus fibre-optic cable within an OLO duct. Please contact all other operators for further details of their apparatus within that area.

WARNING: Data from the Scotia Gas Networks (CGM DataSource) dataset for tile nj9309ne is old (126 days) and should be used with caution or replaced with more upto date data

WARNING: Data from the Scotia Gas Networks (CGM DataSource) dataset for tile nj9409nw is old (126 days) and should be used with caution or replaced with more upto date data.



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DATE: 22 Jan 2015
EXTRACT DATE: 18 Sep 2014
MAP REF: NJ9409NW
CENTRE: 394017, 809650
SCALE: 1:2,093

LP Mains
MP Mains
IP Mains
LHP Mains
NHP Mains

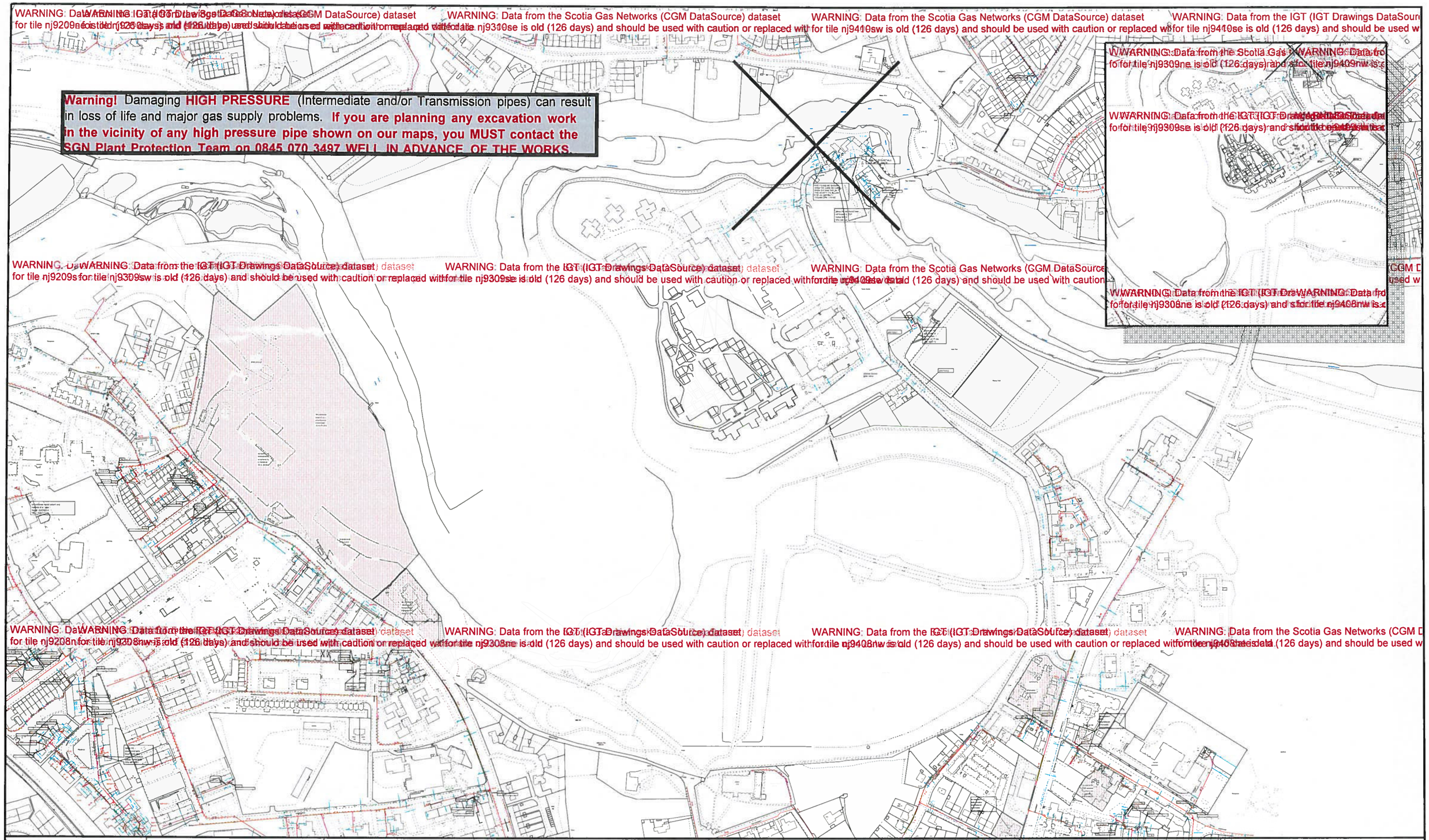
Valve | Depth of Cover | Syphon | Diameter Change | Material Change

This plan shows those pipes owned by Scotia Gas Networks plc in their role as a Licensed Gas Transporter (GT). Gas pipes owned by other GTs, or otherwise privately owned, may be present in this area. Information with regard to such pipes should be obtained from the relevant owners. The information shown on this plan is given without warranty, the accuracy thereof cannot be guaranteed. Service pipes, valves, syphons, stub connections, etc. are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Scotia Gas Networks plc or their agents, servants or contractors for any error or omission. Safe digging practices, in accordance with HS(G)47, must be used to verify and establish the actual position of mains, pipes, services and other apparatus on site before any mechanical plant is used. It is your responsibility to ensure that this information is provided to all persons (either direct labour or contractors) working for you on or near gas apparatus. The information included on this plan should not be referred to beyond a period of 28 days from the date of issue.

Product: UtilityMaps
Version: 1.6.6.1
Template: 'Scotia Gas Networks (A4 Landscape)'

N

Scotia Gas Networks
Delivering gas safely, reliably and efficiently



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DATE: 22 Jan 2015
EXTRACT DATE: 18 Sep 2014
MAP REF: NJ9309SE
CENTRE: 393879, 809274
SCALE: 1:4,825

LP Mains
MP Mains
IP Mains
LHP Mains
NHP Mains

Valve | Depth of Cover | Syphon | Diameter Change | Material Change

This plan shows those pipes owned by Scotia Gas Networks plc in their role as a Licensed Gas Transporter (GT). Gas pipes owned by other GTs, or otherwise privately owned, may be present in this area. Information with regard to such pipes should be obtained from the relevant owners. The information shown on this plan is given without warranty, the accuracy thereof cannot be guaranteed. Service pipes, valves, syphons, stub connections, etc. are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Scotia Gas Networks plc or their agents, servants or contractors for any error or omission. Safe digging practices, in accordance with HS(G)47, must be used to verify and establish the actual position of mains, pipes, services and other apparatus on site before any mechanical plant is used. It is your responsibility to ensure that this information is provided to all persons (either direct labour or contractors) working for you on or near gas apparatus. The information included on this plan should not be referred to beyond a period of 28 days from the date of issue.

Product: UtilityMaps
Version: 1.6.6.1
Template: 'Scotia Gas Networks (A3 Landscape)'

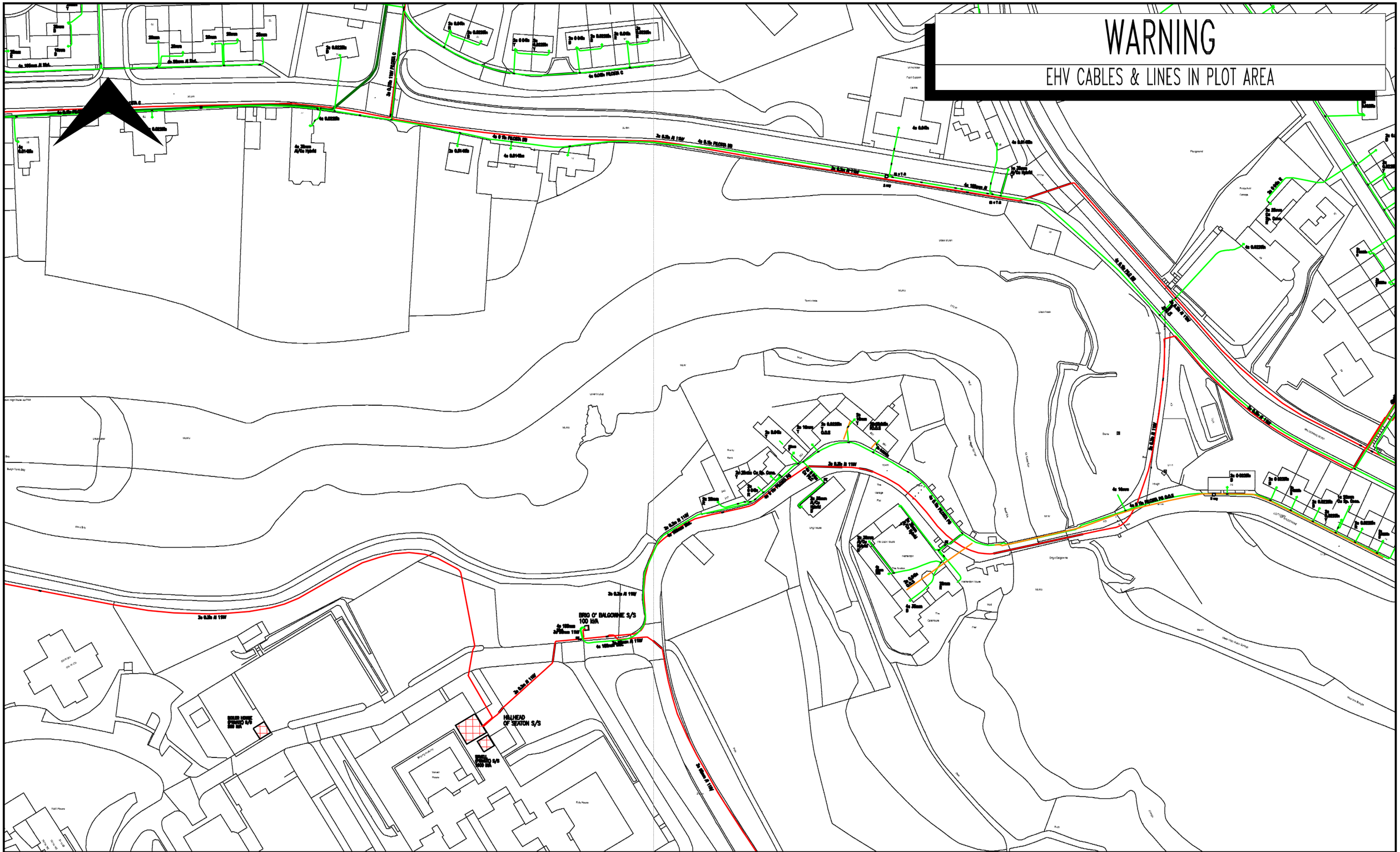
N

Scotia Gas Networks
Delivering gas safely, reliably and efficiently


Aberdeen Science and Technology Park
Grampian Lodge
Aberdeen Science and
Brae o' Don
River Don
Seaton Park
Hillhead Halls of Residence
Seaton Cottage
Cranmonton Lodge
Pot Water
Bridge of Don
Seaton Primary School
SEATON

WARNING

EHV CABLES & LINES IN PLOT AREA



NORMAL DEPTH TO THE TOP OF THE CABLE WHEN LAID.

	services	l.v.	h.v.	e.h.v.
FOOTPATH	0.40m	0.45m	0.60m	0.75m
ROAD CROSSING	0.60m	0.60m	0.75m	0.90m

l.v./services – up to 1000V.
h.v. – over 1000V to 11,000V.
e.h.v. – 22,000V to 132,000V,

WARNING

There may have been subsequent alterations to the surface levels. Trial holes must be taken to determine positions and depth of cables. HS (G) 47 Booklet from the Health and Safety Executive – Avoiding Danger from Buried Cables – should be consulted before commencing excavation work. (available from HMSO)

WHEN WORKING IN THE VICINITY OF OVERHEAD LINES THE HEALTH AND SAFETY GUIDANCE NOTE GS6 SHOULD BE CONSULTED. (AVAILABLE FROM HMSO)

Scottish and Southern Energy plc.
Registered in Scotland No. 117119.
Registered Office: Inveralmond House
200 Dunkeld Road,
Perth, PH1 3AQ.

seaton Park 1

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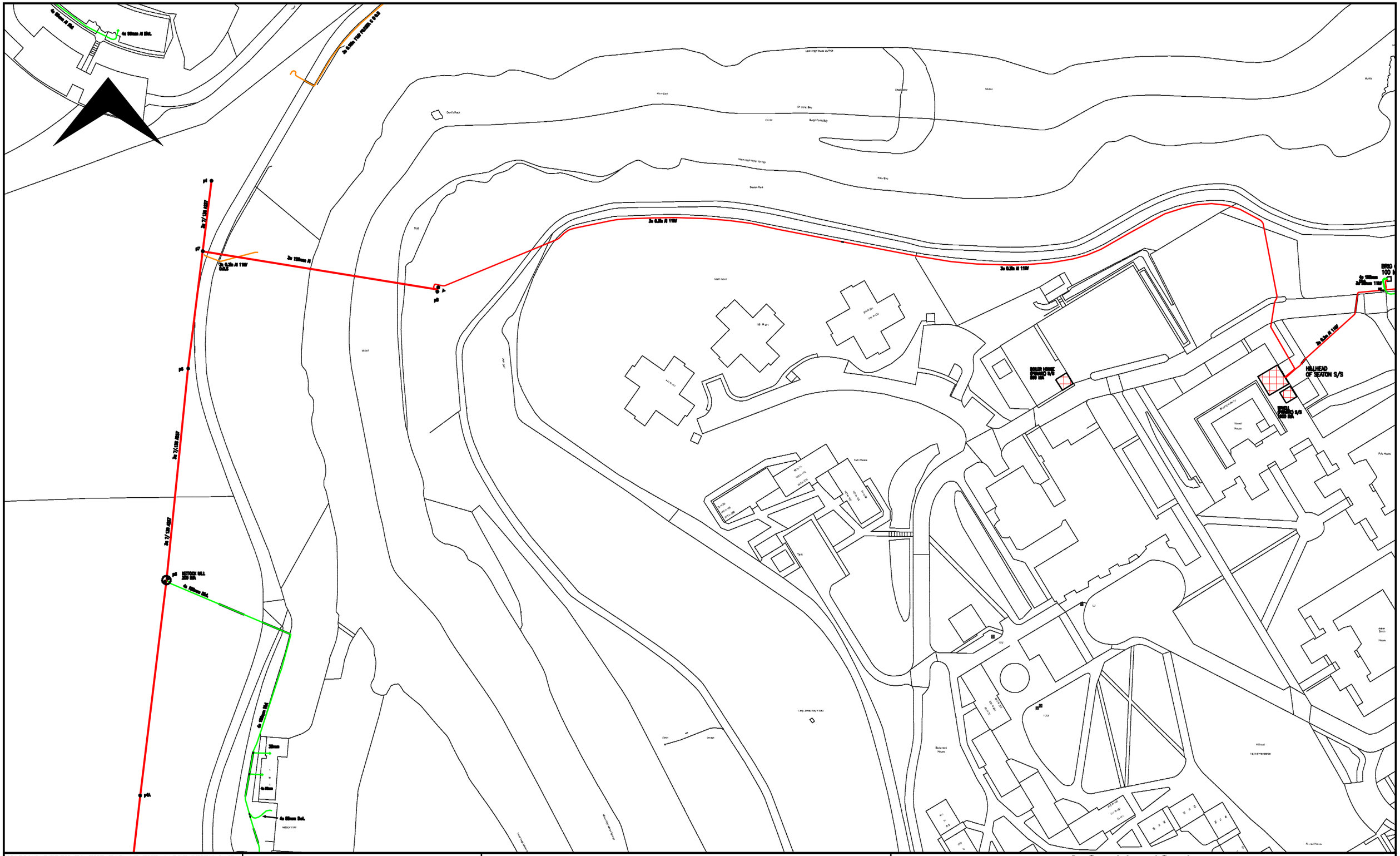
Scottish and Southern Energy

NORTH EAST DISTRICT
Tel: 01224 667200

Grid Ref: NJ94010965
Scale: 1:1250
Date: 26/01/2015
All Voltages



NORMAL DEPTH TO THE TOP OF THE CABLE WHEN LAID.				
	services l.v.	h.v.	e.h.v.	
FOOTPATH	0.40m 0.45m	0.60m	0.75m	
ROAD CROSSING	0.60m 0.60m	0.75m	0.90m	
l.v./services	– up to 1000V.			
h.v.	– over 1000V to 11,000V.			
e.h.v.	– 22,000V to 132,000V,			

WARNING

There may have been subsequent alterations to the surface levels. Trial holes must be taken to determine positions and depth of cables. HS (G) 47 Booklet from the Health and Safety Executive – Avoiding Danger from Buried Cables – should be consulted before commencing excavation work. (available from HMSO)

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Registered Office: Inveralmond House
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Scottish and Southern Energy

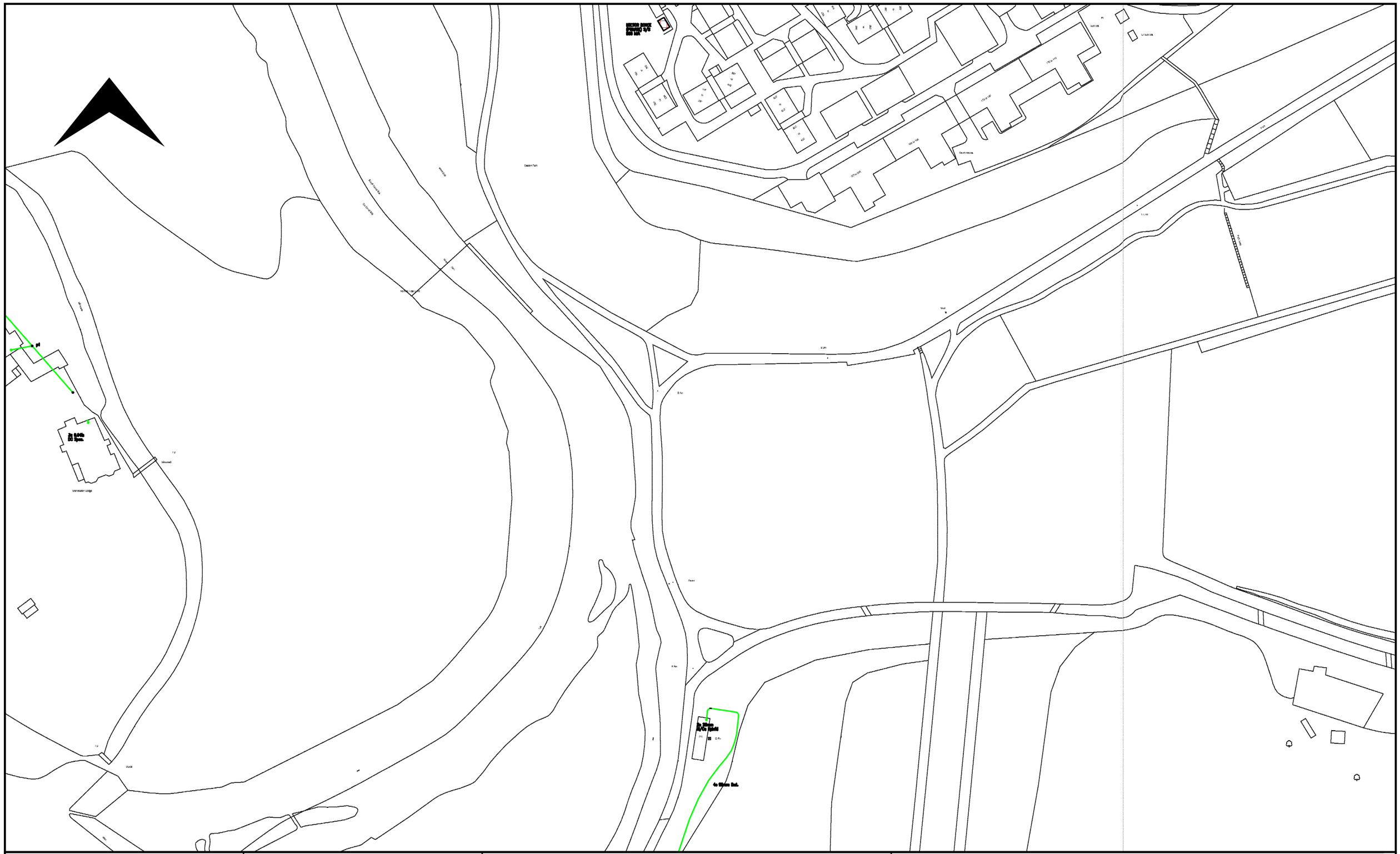
NORTH EAST DISTRICT
Tel: 01224 667200

Grid Ref: NJ93720952

Scale: 1:1250

Date: 26/01/2015

All Voltages



NORMAL DEPTH TO THE TOP OF THE CABLE WHEN LAID.				
	services	l.v.	h.v.	e.h.v.
FOOTPATH	0.40m	0.45m	0.60m	0.75m
ROAD CROSSING	0.60m	0.60m	0.75m	0.90m

l.v./services – up to 1000V.
h.v. – over 1000V to 11,000V.
e.h.v. – 22,000V to 132,000V.

WARNING

There may have been subsequent alterations to the surface levels. Trial holes must be taken to determine positions and depth of cables. HS (G) 47 Booklet from the Health and Safety Executive – Avoiding Danger from Buried Cables – should be consulted before commencing excavation work. (available from HMSO)

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Perth, PH1 3AQ.

seaton Park 3

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Scottish and Southern Energy

NORTH EAST DISTRICT
Tel: 01224 667200

Grid Ref: NJ93840916
Scale: 1:1250
Date: 26/01/2015
All Voltages

WARNING

GAS IN PLOT AREA

EHV CABLES & LINES IN PLOT AREA

RYB
O.O.S

1 Duct 100mm

26.8m

3c 0.15in 33kV fluid filled - DSO

Tele. 4 pr

2x (3c 0.3in Cu 33kV fluid filled - DSO)

2x (pilot)

TILLYDRONE ROAD

TILLYDRONE TERRACE

4c 185mm Al

4c 0.1in

25mm Cu

25mm
Cu

Domeagain

2c 0.04in
Y

80

2c 35mm
Al/Cu Hybrid

2x (Tele Jt.)

Posts

4c 0.04in

2c 0.2in

4c 0.1in O.O.S

4c 95mm Al Dist

27.0m

PE

4c 0.1in PILCSTA 'C'

2x (pilot)

2x (3c 0.3in Cu 33kV fluid filled - DSO)

Benholm's Lodge

known as the

Wallace Tower

Downie's
Cairn

31.4m

3c 0.15

P Const Bdy

Pot Water

Utd

Aberdeen House

NORMAL DEPTH TO THE TOP OF THE CABLE WHEN LAID.				
	services	l.v.	h.v.	e.h.v.
FOOTPATH	0.40m	0.45m	0.60m	0.75m
ROAD CROSSING	0.60m	0.60m	0.75m	0.90m

l.v./services – up to 1000V.
h.v. – over 1000V to 11,000V.
e.h.v. – 22,000V to 132,000V,

WARNING

There may have been subsequent alterations to the surface levels. Trial holes must be taken to determine positions and depth of cables. HS (G) 47 Booklet from the Health and Safety Executive – Avoiding Danger from Buried Cables – should be consulted before commencing excavation work. (available from HMSO)

WHEN WORKING IN THE VICINITY OF OVERHEAD LINES THE HEALTH AND SAFETY GUIDANCE NOTE GS6 SHOULD BE CONSULTED. (AVAILABLE FROM HMSO)

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Seaton Park 4

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Scottish and Southern Energy

NORTH EAST DISTRICT
Tel: 01224 667200

Grid Ref: NJ93550894
Scale: 1:500
Date: 26/01/2015
All Voltages

NORMAL DEPTH TO THE TOP OF THE CABLE WHEN LAID.				
	services	l.v.	h.v.	e.h.v.
FOOTPATH	0.40m	0.45m	0.60m	0.75m
ROAD CROSSING	0.60m	0.60m	0.75m	0.90m

l.v./services – up to 1000V.
h.v. – over 1000V to 11,000V.
e.h.v. – 22,000V to 132,000V,

WARNING

There may have been subsequent alterations to the surface levels. Trial holes must be taken to determine positions and depth of cables. HS (G) 47 Booklet from the Health and Safety Executive – Avoiding Danger from Buried Cables – should be consulted before commencing excavation work. (available from HMSO)

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Registered in Scotland No. 117119.
Registered Office: Inveralmond House
200 Dunkeld Road,
Perth, PH1 3AQ.

Seaton Park 5

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Subject to revision without notice.

Scottish and Southern Energy

NORTH EAST DISTRICT
Tel: 01224 667200

Grid Ref:	NJ94160919
Scale:	1:1250
Date:	26/01/2015
All Voltages	

WARNING

GAS IN PLOT AREA

NORMAL DEPTH TO THE TOP OF THE CABLE WHEN LAID.

	services	l.v.	h.v.	e.h.v.
FOOTPATH	0.40m	0.45m	0.60m	0.75m
ROAD CROSSING	0.60m	0.60m	0.75m	0.90m

l.v./services – up to 1000V.
h.v. – over 1000V to 11,000V.
e.h.v. – 22,000V to 132,000V,

WARNING

There may have been subsequent alterations to the surface levels. Trial holes must be taken to determine positions and depth of cables. HS (G) 47 Booklet from the Health and Safety Executive – Avoiding Danger from Buried Cables – should be consulted before commencing excavation work. (available from HMSO)

WHEN WORKING IN THE VICINITY OF OVERHEAD LINES THE HEALTH AND SAFETY GUIDANCE NOTE GS6 SHOULD BE CONSULTED. (AVAILABLE FROM HMSO)

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Seaton Park 6

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Scale: 1:1250

Date: 26/01/2015

All Voltages

APPENDIX C:

CONCEPTUAL VISUALISATIONS

Artist’s impressions / site visualisations used within the public consultation

How wet should Seaton Park be?

Very wet

Quite wet

Quite dry

Very dry

What sort of wet would you like to see in Seaton Park?

Wetland with plants

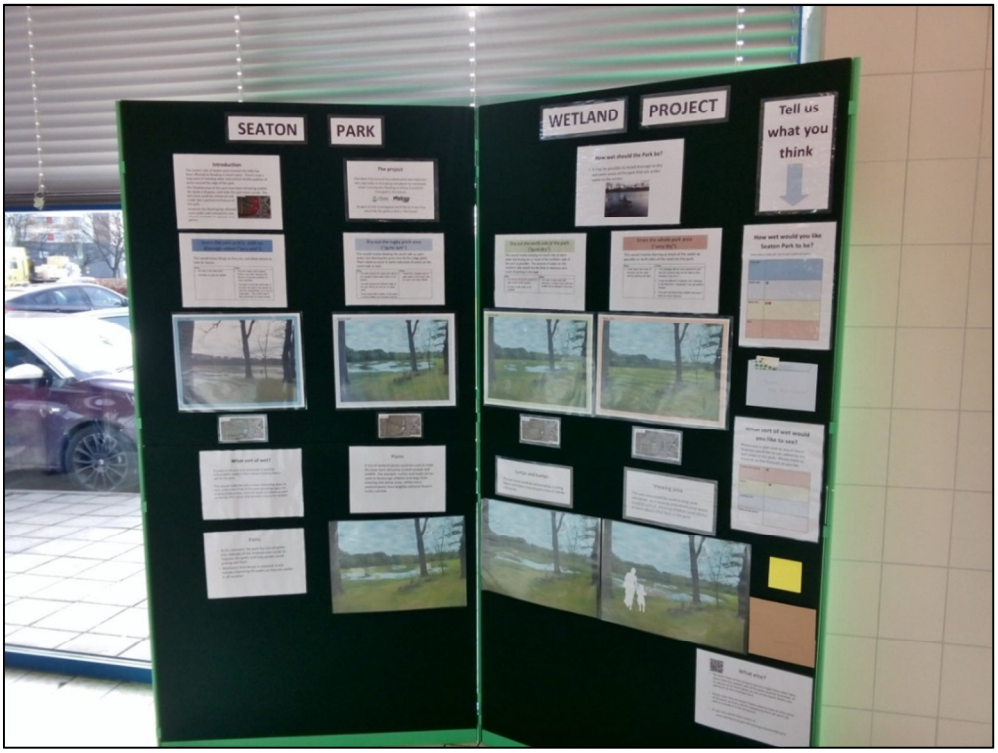
Wetland with ‘lumps and bumps’

Wetland with viewing platform

APPENDIX D:

PHOTOS OF PUBLIC DISPLAY

Display in Lidl store



Display in Brig o'Don pub

Display in St Machar’s cathedral

APPENDIX E:

PUBLIC CONSULTATION RESPONSES

The comments have been grouped according to respondents' choice of "How Wet?" Obvious typographic mistakes have been corrected and personal information removed, otherwise the information below solely represents the opinions of the respondents. The comments are not presented in any order of importance or content – within each group they are chronological (i.e. earlier comments appear near the top of each group)

Very wet (46 comments, 112 votes)

this area has been wet for some time now, and is very good for attracting a wide variety of bird life, it may dry out on it's own, given time that is. It is also a good watering hole for the various deer, maybe a small fence to stop young children from straying too near the water, and of course to keep out unattended dogs. You could also have a notice posted depicting all the various kinds of birds, ducks, swans, etc, etc...or; -you could just leave it as is and let mother nature take her own course.
The larger the patch of water, and the swampier the margins, the less any wildlife will be disturbed by passing people and dogs. Introducing too much vegetation will rapidly clog the shallow water - look what happened at Allan Park in Cults!
let's try and not change it too much, it isn't that hard to enjoy the area without getting wet feet
You could move the rugby pitch to the open area of unused grass behind the play park (between the park and the bank up to the cathedral, bordered by the formal gardens). That seems to be a very unused part of the park. There is a lovely circuit walk from the car park, to river, to Brig, then back into park at walled gardens, and down back to carpark - better signage (coloured posts?), more accessible pathways there?
Please keep and cultivate the wetlands in Seaton Park further. Wetlands with plants, islands, birds and frogs would be a beautiful addition to the park and be an interesting educational attraction for children and adults alike.
I'd really leave it as it is with minimal human interfering. It appears to be developing quite nicely naturally. It does tend to 'dry' out during the summer though, so if there was some way of retaining an area of open water at that time of year that would be of benefit.
1) The wetland area is already a magnet for wildlife and it is accumulating wetland species on its own studying natural colonisation and succession there might be a good idea. 2) Deer and fox are frequent visitors. Otters have been expanding down the Don and there are now resident otters near Seaton Park and at Donmouth (where we live). Bats will hunt across the surface of the water (they already do, I think). Whatever plan is established needs to factor in wildlife corridors, especially given pressure on the riverbank deer movement from the developments around the Third Crossing. 3) An integrated trail (cycle and footpath, clearly distinguished and protected) right along the Don, up past Dyce to Alford and thereabouts, that connected habitats, would be a GREAT THING. 4) Clearly #2 and #3 go together... 5) Dogs and cats will cross into any wetland. if you want nesting areas make sure that the water is deep enough here and there to dissuade at least some of the interlopers, and perhaps make not-so-obviously attractive paths for us dog-walkers that guide us naturally away from this wetland and towards the Don proper.
Minimum intervention is most sustainable in long-term. Part-draining might have knock-on negative undesirable

impacts elsewhere.
Despite many good wetland sites in Aberdeenshire and beyond Aberdeen City itself seems to lack ephemeral wetlands. This would seem to be an ideal opportunity to build on what nature seems to have already started! The recent publicity brought to the City and Seaton Park in particular by the appearance of the rare Harlequin Duck has highlighted the potential that such wetlands may provide as a local nature reserve and would surely provide much needed experience of learning about wildlife within an otherwise urban environment.
This a fabulous opportunity to go with nature rather than fight it. It ties with the JHI project 'Pooling our Ponds' and the Council's recent amazing work at East Tullos burn. It's a wee bit of a re-wilding project in an urban setting- a remarkably pro-active stance to incorporate wildlife into our city! ***These are personal opinions***
Although both sides in their present wet condition are good for birds the south side appears to be more important than the north side. If demand was high for reclaiming the north side sports area pitches then a reasonable compromise would be to try to retain the south side as much as possible in its existing state. This would cover both sporting and wildlife interests. Well done for raising this.
There is a great deal of wildlife that visits Seaton park, I have been told by many of my friends about the otters, kingfishers and the rare harlequin duck that are there. I was unaware of the amount of wildlife in the park when I lived in Aberdeen or i would have gone but I will definitely be making more visits to it in the future and if managed properly as wildlife habitat it could be a lure for the eco tourism industry if advertised enough I will be making a trip to see it for myself in the very near future
This will be a great asset to Aberdeen, it is already recognised as a place of interest for wildlife as featured on the BBC Nature Watch. Improving the wildlife habitat can benefit us all.
It would be worth having some information about the wildlife that can be seen in the park on a board in the car park close to the wet area.
I think the idea to create an accessible, naturally looking and feeling wetland is a wonderful addition to the park. It would attract further species which already frequent the river area and also the Donmouth nature reserve. This would also attract new species who need standing water, it could even become a winter feeding ground for geese. But it will be important to keep it a naturally looking place with lots of possibilities to hide. None the less, a viewing area would be wonderful so that people can see the animals (with signs on the viewing area, they can even learn about animals they currently cant see). As for the paths, when you plan to do an accessible viewing area you will have to make some kind of wooden construction anyway. So, why not elevate the part along the Northern edge by building a pontoon walk which would increase the view over the wetland from a larger area and without stairs would keep everything accessible for all people at all weather situations. An important thing for me would be to place plenty of benches; the park is used by students as a lunch break place and by many elder people who enjoy sitting in the sun. Why not combine that with the view over the wetland. Another thing you could consider is an observation hut where people could look out without disturbing the animals. In Scottish weather, this would also be an advantage when it is stormy or rainy. I would like to get further involved and would like to talk with you about my ideas if that helps. Let me know and make it a nice area....
The ducks and waders like it as it is judging by the numbers that are there.
I would prefer seeing this area left as it is (with the addition of some native plants and grasses to provide additional cover for animals) so that it can provide a small haven for wildlife. Any walking paths should be kept at a distance to avoid disturbances to the wildlife. It's fantastic that this flooded space has been left as a wetland and I hope that it will remain a permanent fixture in Seaton Park.
A balance could be struck changing the paths so that birds would feel more secure but without impeding the public enjoyment of seeing a wildlife space and some of what this contains. The practical side of things could be made into a project that volunteers would be willing to spend their time on so reducing costs and creating a good outdoor

opportunity for improving health.
This is an ideal opportunity to give the opportunity for people to experience and enjoy local biodiversity that should be their. This is also an ideal opportunity to have a local water vole reintroduction with a hide for people to experience first hand the benefits of ecological restoration
There are few areas within Aberdeen for wetland birds, this would provide a useful place for them.
This is a unique opportunity to create an excellent wetland wildlife area close to the heart of Aberdeen and, as such, should not be missed. The RSPB Office would also be a good source of advice in relation to wetland habitat creation. One word of warning - although introducing wetland plants is a good idea, it should be ensured that only species native to the area (and preferably of local provenance) should be used. It would be a tragedy should an alien invasive such as *Crassula helmsii* be inadvertently introduced.
I think the idea of leaving the wet area and turning it in to a wetlands is a great idea. With a little work, planting etc. it could be a nice area for wildlife and people. I walk through Seaton every day and have enjoyed watching the arrival of wildlife.
It would be great to keep this area of wetland for wildlife. It would be great to see it planted to create a habitat rich for many different species. Maybe including some sort of educational board for information and education would be beneficial or an eye spy kind of board for children to encourage their interest in wildlife. It is sad to see the number of farmers in Aberdeenshire who have drained areas like these and important habitats have been removed. Insects, dragonflies, wintering birds, plants, etc - would be great to see!
It would be best to leave the area as natural as possible. Adding some native plants would be sensible but please avoid anything alien or of a cultivated style. The most sensible suggestion about looking after the area is to leave it alone unless homes or commercial premises are under threat from more water.
There is a pleasing and useful mix of landscape type and land use in the park from formal garden beds and paths to 'wild' areas especially the river, and playing fields. The wet area would enhance and extend the landscape type and would be more accessible to people to watch wildlife and understand the diverse needs of different species - especially wetland species. The river is not very accessible to children as it is not a very safe environment so the wet area could be an area of great interest and give a great deal of pleasure to many people who could access it easily from anywhere in the city. It would be a great place to do learning activities with children (schools) and youth and families etc - a great opportunity! without much cost! Lots of people have to spend a great deal to make a wet or pond area. Local schools or community groups could have ownership of projects to provide 'homes' for nature and to provide interpretation etc.
A formal boundary incorporating a path round the wetlands would be good idea.
only plant native species plants. work with local wildlife groups to maximise the habitat creation opportunity.
The park would be greatly improved if cars were prevented from driving right through the middle of it. I love the fact that it has so many potential wild areas, such as the wooded areas and alongside the river. The added wetland with plants, lumps and bumps will make it a beautiful park alongside the very formal gardens and fountain area. it is a host to may varied wildlife at the moment from all kinds of birds to deer/otters and seals. lets keep it wild and keep the sports on playing fields and out of parkland.
This is a great opportunity for creating both wildlife habitat and for the public to get to know wildlife better!
Seaton has a very unique wildlife, e.g. very famous Harlequin duck. Also, is a place of habitant of a rare bird that there are only 12 in the whole UK. If you dry the wetland, we might lose that heritage and there will be nothing we

can teach to our children. Seaton's wildlife attracts visitors from all over UK. There's plenty of dry areas around town that people can use, and we should care for our wildlife.
Please try to secure the wet area in some manner so that children and dogs cannot interfere with the host of wildlife who are already welcoming this oasis! In time all manner of creatures will come to depend on the wetland area and I think it is vital to offer them some manner of protection as not all visitors to the park care for nature and some may even try to harm them
I am a local resident of Old Aberdeen and work at the University. In the 6 years I have been here, I have really enjoyed the growing wet area of the eastern side of Seaton Park and watching the wildlife start to use it - I visit at all times of the day, morning, over lunch and in the evenings. I have spotted mallards, widgeon, black headed gulls, herring gulls, mute swans, woodcock, snipe, oystercatchers, redshank, carrion crows, jackdaws, rooks, using and roosting in the wet areas on both south and north side of the entrance road. Just last weekend in the evening from my back garden, I was thrilled to see a small flock of pink footed geese swing over my house and the trees on the south side of the park's entrance behaving as if they wanted to land at the entrance wetland. I would really love to see this area left as wet as possible for the wildlife. Enhancing the wetlands for wildlife with islands, bumps and native plants seems like a good idea, if done primarily for wildlife. After it is established for some time and proven attractive to wildlife, a small observation platform and interpretation can be added. I understand that having the rugby pitches less wet would be ideal (raise the ground with fill?) and certainly relocating the path on the north side out of the wet would be desirable. Seaton Park is a real jewel for of its diversity of formal gardens, semi-natural woodland and riparian environments and recreational areas. Allowing and even encouraging the growth of the wetland areas at the park's entrance (probably park of a natural hydrological cycle) is a unique opportunity for improving the park's attractiveness for all of us - and especially the wildlife, which these days have fewer and fewer places live. As an area resident and member of the local RSPB local group, which helps maintain NE Scotland local preserves, I would happily pledge my time as a volunteer to work towards achieving a healthy wetland area in Seaton Park attractive for local wildlife and park visitors. Thank you for this opportunity to share my thoughts on this issue.
The path to the north that you refer to has been accessible with difficulty well before the recent water feature on the left as you come into the park. Also you neglect to mention the deer that come on the right of the road into the park in the area south of the aforementioned peripheral path.
There are already paths right round the park which can be used by anyone even above the wet areas but they may be steep for wheelchair/disabled so presumably that is why you say you would need to raise the path? As a suggestion, I would not put plants all round to discourage kids/dogs, but allow sloping areas or even a small embankment so kids could use nets for insects and frogs to learn about diversity. I think schools may like this too as it adds another facet to the park for their visits. Viewing areas would also be good, more than one better. And perhaps some areas of rough stone bank which would encourage yet more wildlife. I'd be very sad to see the area drained at all - sportspeople in Aberdeen (who are in a minority when you look at the population), are already well catered for.
If it chosen to retain a wet area, planting of reeds etc are essential for aerating the water preventing it from becoming stagnant which currently is happening. Trees will also be affected by waterlogged roots, but I like the idea of the lumps and bumps too. Here I a great chance to have something different in the city and enhance bio diversity. It would attract more wading birds insects and invertebrates. Good luck with whatever is decided :-)
The park was originally a River Meander according to some of the old maps of the area, so I feel that instead of trying to change the nature of the area, we should just go with the flow - excuse the pun!
The area has attracted excellent numbers of birds such as Teal to the wetland in the last few weeks and there are very few other freshwater areas in Aberdeen. I think it should be kept as a well-flooded area attractive to ducks in winter and wading birds in spring and autumn.
The proposal to make the wetlands into a permanent feature is an excellent idea. I would suggest going even further

with the proposal if it would be possible to maintain at least some open water all year round. It might be worth looking at piping a (modest) flow of fresh water from the river upstream to prevent the standing water from stagnating and to obviously maintain water during dry spells.
Lumps and bumps sounds great
A board walk could be utilised as a walkway to keep feet dry instead of moving the path uphill.
I would quite like a board walk to go around or through a wetland area - that would be a really positive feature This park has long been a poor relation in terms of investment - it deserves some serious funding - for the formal gardens, for reinstating the fountain, for better and bigger kids climbing frames and a decent cafe or at least a mobile cafe.
It would be helpful if the area along the river bank to the right of the toilet block could have more benches/tables as this is a nice area to picnic in.
I think the full wetland idea is a great one. Adding some features to the landscape and some plants to give Mother Nature a helping hand would mean more wetland animals and insects moving in faster, I enjoy seeing the water birds and other animals there as things are. I'm not aware of any other feature like this in or close to Aberdeen and it could be a great attraction. I saw all the 'twitchers' in the park looking for the Mandarin Duck a few weeks back, we might get more different species on a regular basis. We already have lots of dry park areas in town that are easily accessible but a wetland area would be a real bonus. There's a wetland walk out at Burn 'O' Vat on the walks there and I think something akin to this would be a great feature in town. Some of those educational boards to let folks know what they're looking at and what species they might see would be good as well. There are still dry areas in the park for other uses and plenty dog walking areas. Raising the path up the embankment needn't necessarily limit wheelchair access and would also give a fantastic vantage point over the whole area. I find this an exciting prospect.
Could we have hides erected as well please
The flood has been very interesting, in a local context for birds as there is little standing water in the city of significant size. For instance a coot stayed for some time last winter - a rare bird locally away from Corby Loch. I'd be in favour of maximising the size and depth of the flooded area.
The park is already an excellent mixture of formal landscaping, semi-natural woodland and wildness of the River Don. Keeping the wet area as wild and natural as possible would be a great addition to the park's features and diversity. A wetland feature could be an excellent outdoor learning resource for schools and indeed the general public. If there is no attempt to drain any of the areas currently susceptible to flooding, then the wetland project would have more scope to succeed as a permanent feature of continual interest and biodiversity. Such wild landscape features are even recognised by competitions such as Britain in Bloom nowadays. Community involvement and possibly University of Aberdeen students could all contribute to its upkeep. Local businesses might also be invited to support its upkeep. However, if the wetland is maintained as a large wild area then the amount of required maintenance will be very much reduced.

Quite wet (36 comments, 114 votes)

A sheltered seating area or areas and outdoor gym equipment
is the rugby pitch used much? if not, don't necessarily have to dry out that specific area.
I love Seaton Park and have visited, mainly as a runner, for the past 15 years. I found the wetland area actually quite exciting. At one time the wetland was so large that I didn't ever think it would drain away again but by Summer it had vanished to almost nothing. I think this is an exciting development that I fully support.
If you have this as a permanent wetland, on the high up path beside St Machar Cathedral to the South East it might be nice to have a seated observation area overlooking this part of the park. This might need a small clearance in the tree canopy to assist all year visibility.
I think keeping quite a wet part of the park would be great. Making a viewing area, where children can go (supervised) and learn about what is living in and around the wet area would be great for their nature studies and maybe encourage them to do things around where they live in order to help nature.
The introduction of native species of plants would be important. As well as a viewing platform, perhaps it would be possible to accommodate a series of information posts or signs around the area; like a nature trail that people could follow round the park.
Creating a wetland area in Seaton Park is a fantastic idea and would be a huge boost for wildlife and would encourage more people to visit the park. Seaton Park doesn't have a brilliant reputation as a park and this could be a fantastic opportunity to create regeneration and alter any negative preconceptions. It could provide educational opportunities for adults and children, especially if a viewing area is created, and it could also prove to be a useful tourist attraction, which would generate income for the city - e.g. recent media coverage of the harlequin duck in Seaton Park in the news and BBC Springwatch, which attracted many visitors from outside Aberdeen. This seems like a fantastic use of an area of the park that is often under-used.
It would be wonderful to maximize the benefit of the park to wildlife, while not upsetting other park users. Could any of the dry areas be converted to wildflower meadows too and could there be a wildlife garden area with nestboxes and bug hotels and interpretation to tell people about looking after wildlife.
I have to confess I have only recently started to visit Seaton Park and I am very pleased with what I saw. Otters, Herons etc all made the visit extremely interesting.
Seaton Park is an amazing place, one of my favourites in Aberdeen, and I just wish the Council does not spoil/damage it in any way. I do think something has to be done to avoid further flooding but with lots of care. I went there this morning with my daughter and we were amazed by all the ducks (and the two swans) that were around. It seems that this Seaton Park Wetland project is taking this issue seriously and I am very pleased to hear there are reasonable people involved that will take care and prevent any 'bad intervention'.
I think developing this part of the park as a wildlife wetland area could be very beneficial, given the level of recent interest in rare ducks visiting the area. Anything that improves the park and surrounding area is to be welcomed as this might well attract more people to explore it and make use of it. If the wetland was developed using plants as much as possible to create the environment, this would cut down the amount of maintenance required when compared with some of the other options such as the humps and bumps suggestion. Perhaps a 'Friends of Seaton Park' group could be created to oversee on-going park development, much as has been done with Hazlehead and the Duthie Park, both of which have benefitted greatly from such groups.
Vehicle traffic to the park needs to be slowed down considerably
Given that there are wild birds and the swans at present there is no noticeable presence of community wardens and the police drive into the car park and straight out again so it would be nice to have a regular walk through. Dogs

attacked swans before Christmas and a more meaningful regular police or warden presence would perhaps be a deterrent to those people who do not value the wild life.
I particularly like the 'natural' aspect of Seaton Park so wouldn't like to see too much landscaping. I do think the parks need to provide a space for sport so making the pitches playable should be a priority. I am surprised that drainage to one side will result in decreased water level in the other. Can this be addressed so we have a properly wet area for wildlife? While agreeing information and a viewing area are a nice idea, I think the wildlife would probably prefer us to stay away.
Most of the park has suffered from lack of drainage for years, even if all the ditches from the park entrance round the south side were cleared out it would help the catch the run off the banks and into the grass. The grass area to the south west of the park also suffers from this. this would be a cheap option to start with?
Just that I think its fantastic that developments might take place within this wonderful park! People of this area - and beyond would be able to visit more regularly! good luck!
Lighting for the paths.
The embankment beyond the flooded lower northern path appears to have at least one spring and significant boggy area on it. Drainage and channelling for this section may also need to be addressed, whether draining the rugby/football pitches or just raising the lower path up the embankment, as it may currently be having a significant effect on the flooding of this area/may affect the stability of the foundations under a re-routed new path.
whatever options are selected they should be designed as low maintenance because that is usually the problem with things the Council do.
As a student with the University of Aberdeen, I visited this park every day. I reflected on the bird life at nearby river Don and how the park seemed to be devoid of bird species other than song birds. After heavy rains, the River Don became a torrent, which does not provide much sanctuary for water birds. Creating a wetland in the park is a wonderful idea.
It will be important to ensure minimal impact of the proposed enhancements on local residents. Maybe some additional information to be provided about what a managed wet area would mean for the surrounding flats and houses? Besides birds, what else is it going to be attracted?
An area that is safe for wildlife and attracts wildlife plus more wetland plants would be good. Need to maintain dry areas for sport and if overall make nice place to walk and enjoy then a good objective and one I would support.
There is always a lot of rubbish when we walk through Seton park and we can end up picking up a whole bag full. That will need to be tackled better if it's not to endanger the wildlife you are trying to attract.
I think this would be best developed as a wt area to encourage wildlife ie ducks swans etc etc.
Recently a group of Travelling People have set up camp in the public car park denying the general public the use of the car park by the manner in which they have parked their caravans and associated vans and cars. If this project goes ahead I would recommend that some form of barrier is put in place to prevent the travelling people access to the park. It is likely that if the travellers are allowed access to the park the wet land area would become a dumping area for all sorts of materials.
Many thanks for organising this consultation and taking steps to improve the park. Children from St Peter's School visit regularly for whole school events such as our annual Autumn Walk and Fun Run, for class lessons in sports, science (nature) and art and, in the past, for the Big Bird Watch, Forest Schools and for healthy picnics. If there are any ways in which children can help to look after the area eg litter picks, making information boards about birds that visit, observation notes about plants etc...we would love to be involved.
There appears to be an abundance of wild life since the grass flooded and although it was good for dog walking and

letting them go wild when it was dry I think the wet lands give a new dimension. As long as there is still adequate provision for children and the play area then I think we just accept natures changes and work with it.
I really like the way that nature has reclaimed the soggy east side of the park so would be sad if it ended up getting completely drained (never really saw people using that end when it was dry). If a viewing area was established then info boards would be good with the plants and wildlife on it. Could be a good way of getting groups of kids interested in nature.
A wee viewing platform would be lovely! The upper path overlooking the wet area will be a marvellous viewing area too, with plenty of tree cover. The pill box can be used as a viewing platform too!
Connectivity - complete the riverside path from Grandholm Bridge to Seaton Park allowing a continuous path from Persley Bridge. Improve the area downstream from the old toilet block to make the area more accessible and enhance the area for family picnics etc.
You're doing a great job, Seaton Park is, precisely because it is relatively wild in addition to the more orderly bits, the most interesting and best-managed park in Aberdeen, it's one of the major reasons we don't want to move somewhere else in Aberdeen. So, whereas perhaps making it a tad less wet, so that you can use all paths, the wild aspect including water has to remain. Some plants, but keep it spontaneous.
Consider bio diversity and educational opportunities
This winter we've seen quite a few birds on the wet area. This gives an added interest to the park.
I like the idea of developing part of Seaton encouraging areas of wetland attractive to different flora and fauna. In some respects like the idea of very wet rather than quite wet, but realise it does have limitations on the use of the park. As far as possible work with the natural flow of events within the park.
Also look into maintenance - lots of graffiti has gone up of late!
Re: what kind of wet? I chose 'lumps and bumps', but ideally there would be a mixture of lumps, bumps, plants and interpretation!

Comments submitted on paper on the physical display (therefore it is not possible to know which category of 'wet' the respondents selected)

Take the bench and bin out of the natural pond in the north. Also remove the 'No Golf' sign
Deepen the south area and make a proper wetland – not just a mucky pond. This might allow north areas to drain into south area. Is it possible also to use the wetland as a flood defence – to remove the risk from further downstream?
I'd like to see the north side dried out but keep the south side with an area of wetland at least the size of 'quite wet' or even 'wet'.
The difference between 'quite wet' and 'quite dry' is a little vague since the location of rugby pitches isn't shown. I prefer quite wet as long as the path round the north side is feinitely dry and maintained.

Quite dry (8 comments, 21 votes)

More toilets would be good.
A wet area can only be desirable if it does not stink in summer and kill the adjacent trees in winter. The extent on the south area should still be minimised
The flooding of the area to the south side of park near the entrance to park is a relatively new occurrence but welcome as it has brought in birds that would not usually be seen in the park. However the flooding to the north side is not to be welcomed as it reduces the area of grass that can be used for various sporting & other activities. I would carry out necessary works to enhance & maintain the flooded area to the south side of park & to ensure it does not increase in size so as to maintain grassed areas to the west for use by the public. The grassed area to the north should be drained to allow its use by the public. My wife & I use the park regularly (on foot & on bikes)& also take our grandchildren there occasionally.
Seaton Park is a vital park for families living in the North of the city, many of which have limited income and no other parks within walking distance. If the improvements go ahead it will increase its use and could attract other business to invest like they do in Hazlehead and Duthie. The park is also widely used by students and enabling sports to be played again is vital. It is a spot of natural beauty and a combination of using it as a wetland and functional recreation ground would ensure funding in the future. Consider looking at Lochend Park in Edinburgh for inspiration.
Any plants would have to be low maintenance as the council has cut down on staff and the current gardener has enough to do already.
Something has to be done, or everything will continue to deteriorate. Travellers will take up permanent residence and the council will close the park because it is unsafe. Then it will become a meeting place for junkies etc. The council will then sell the land/park to [a developer] for a nominal £1 and houses will be built on the land, after [the developer] pays to drain it. On a more serious note, it will be necessary to do something about the raw sewage which periodically flows into the water in the southern area. When the sewer which runs down Don Street gets blocked at Lord Hay's Grove (which happens about once per year) and the flow of sewage coincides with heavy rain the natural flow goes through the main gate of the park and flows into the south side accumulation.
I've chosen the very dry option because I think it's important to have the water body kept to the south east of the Park, so the north east can stay usable for sports. Ideally though, I'd like to see it very wet in the south east section, with lots of interest for people and wildlife. I'd suggest the Council works in collaboration with local communities / organisations in the long term management / maintenance of the Park, e.g. Friends of Seaton Park, schools, etc. They can help to both devise suitable management plans that involve the local community and / or access funding that the Council may be unable to access directly.
The path on the North side under the wooded area of the park (close to the Rugby pitches) certainly needs sorting out as it is impassable for much of the year currently.

Very dry (8 comments, 12 votes)

I would like to return the wetland area to a park area. I have used Seaton Park for the past 50 years & there was no standing water in the park until recent times. There are plenty of wild areas down towards the River Don. This former park area should be returned to parkland.
The paths are uneven, badly drained and generally poorly maintained. Much the same as the parks drainage.
make it wonderful. the park is wonderful and any work should enhance the park and add to its beauty and joy.
Areas for sports are very important, to lose any more of them in this area would be terrible. Especially as the University is so close. I would use the park more if it wasn't so water logged. Even using the paths for jogging on dryer days is a hassle as the water/mud is still there in certain areas. Wet shoes, jumping over large areas or sinking/skidding in mud. Last Sunday I spent an hour walking round with a pram, it wasn't easy to walk the perimeter of the park. However, the middle of the park and the playground was very enjoyable and relaxing. Would structured wetlands make me go more often? I'm afraid not.
The park borders onto the River Don so wet land and aquatic animals will remain along the river fringe. The former park playing fields should have the drainage maintained and returned to a functional system to allow open land for recreation and diversity, The river fringe should be developed to encompass wetland, viewing and aquatic education
There are becoming many areas waterlogged within the city and whilst a wetland area has it's benefits we cannot simply have numerous wetland areas because it's cheaper than maintain the drainage systems. Large green spaces for play will reduce over time and we need to do our best to protect these which means a pro-active approach to maintain our parks which includes fixing drainage problems.
I would like to see the park restored fully to its former glory. It used to be a great asset to the city. I am disappointed that the A.C.C. have decided to not invest in the park, and drain then flooded areas. Making them Wetlands is a poor excuse for not spending money on the park. I played there as a child, and took my own children to play there regularly. It used to have a lovely working fountain, spacious (and dry) playgrounds, and a great selection of items for the kids to play on. The train is the big attraction there, and the children love it. Why can't this rare feature be restored to its original state. So that the people of the area can once again take pride in their park.
Is this wetland project an excuse of the Council to avoid spending enough money to maintain the park in reasonable conditions? It looks like it.

APPENDIX F:

PLANTING COSTS

Plant costs for Seaton park wetland

Emergent/ fringing wetland species

Area (m^2)	Density (plants/m^2)	Total plants	Cost per plant	Total cost
805	5	4025	£0.63	£2,535.75

Wetland species

Area (m^2)	Density (plants /m^2)	Total plants	Cost per plant	Total cost
7440	5	37200	£0.63	£23,436.00

Damp meadow species

Area (m^2)	Seed weight 2g/m^2)	Total seed weight (kg)	Cost per kg	Total cost
9380	2	18.76	£74.00	£1,388.24

Sports turf mix

Area (m^2)	Seed weight 25g/m^2	Total seed weight (kg)	Cost per kg	Total cost
500	25	12.5	£15	£187.50

	Number of deliveries	Total cost
Delivery costs for plants c.£70 per 2000 plants	21	£1,442.88

Total costs **£28,990.37**