FOUL & SURFACE WATER DRAINAGE STRATEGY

Moneystone Leisure Park
Staffordshire

Reference	**5457-JPG-XX-XX-RP-D-0620-S2-P02**
Date	**24 September 2019**
Revision	**P01**
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APPENDICES

CONFIDENTIALITY STATEMENT

This report is addressed to and may be relied upon by the following:

Laver Leisure (Oakamoor) Ltd
Bramall Lane,
SHEFFIELD
S2 4RJ

This report has been prepared for the sole use and reliance of the above-named parties. This report shall not be relied upon or transferred to any other parties without the express written authorisation of JPG (Leeds) Limited. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party.

DOCUMENT HISTORY

Rev	Date	Revision Details	Status	Author(s)	Approved
P01	11.10.2018	Final – Issue to client	Information	JDM	
P02	24.09.2019	Final – Issue to Client	Information	JDM	

1.0 INTRODUCTION

JPG Group has been instructed by Laver Leisure (Oakamoor) Ltd to prepare a drainage strategy report for a proposed leisure park at the former Moneystone sand quarry in Staffordshire.

2.0 THE SITE

The site is located approximately 12 miles east of Stoke on Trent and is a former sand quarry.

The site is located between the villages of Whiston to the northwest and Oakamoor to the southeast.

Access to the site is from Eaves Lane which bisects the site running in a northwest to southeast direction linking the two villages of Whiston and Oakamoor.

The approximate centre of the site is located at NGR 404651,346094 (SK046460).

3.0 DEVELOPMENT PROPOSALS

The proposal is for the construction of a high end leisure park at the former quarry site with potential to operate 52 weeks a year. Phase 1 of the leisure development comprises 190 lodges; erection of a new central hub building (providing farm shop, gym, swimming pool, spa, restaurant, cafe, games room, visitor centre, hub management and plant areas); reuse and external alterations to the existing office building to provide house keeping and maintenance accommodation (including meeting rooms, offices, storage, staff areas and workshop); children's play areas; multi use games area; quarry park; car parking; cycle parking; refuse and lighting arrangements; and managed footpaths, cycleways and bridleways set in attractive hard and soft landscaping.

Outline planning consent was granted in October 2016 and detailed the number of lodges to be 250 units. Phase 1 of the leisure development comprises 190 lodges.

Access around the park will be via several access tracks which will wind their way around the leisure park allowing access to individual car parking outside the lodges and for servicing and maintenance of the lodges.
A 110-space car park and 24 check in spaces will be provided in the Hub area.

There are some existing former quarry buildings which the intention is to reuse for back of house facilities.

4.0 PROPOSED DRAINAGE

4.1 Foul Water Drainage

It is proposed to construct a private gravity drainage system around the park connecting all the lodges and other building all subject to finalised levels design.

Where it is not possible to make gravity connections a pumping station will be installed.

All foul water pumping stations be of the packaged type, design and detailed by specialist. The maintenance of the pumping station will be by the park operator.

The private foul water pumping stations will be designed in accordance with current standards and 24 hours emergency storage will be provided as detailed in Building Regulations Document H.

There will be a café and restaurant facilities on site and foul water discharge from the food preparation areas and kitchens shall discharge via a suitably sized and designed grease interception facility all designed by a specialist.

Ultimately all the foul water discharge will be drained into an onsite packaged treatment plant designed by a specialist to meet current EA requirements for discharge criteria and volume requirements.

The foul water discharge rate from the site is still to be confirmed and will be subject to final lodge numbers and confirmation of the facilities in the hub building and existing retained buildings.

All new foul water drainage will be designed in accordance with BS EN 752, the latest version of Sewers for Adoption and Building Regulations requirements as required.

The proposed foul water drainage strategy for Phase 1 is shown on JPG drawing 5457-JPG-XX-XX-DR-D-1401 and 1402 and is attached in Appendix A.

The foul drainage for phase 2 will be treated in a similar fashion. A private gravity drainage system around the phase 2 park will connect lodges and other buildings on the site.

Foul water drainage from the phase 2 development will be drained into an onsite packaged treatment plant designed by a specialist to meet current EA requirements for discharge criteria and volume requirements.

4.2 Surface Water Drainage

Generally, it is proposed that surface water runoff from the lodges and the access tracks will discharge onto the ground and infiltrate. It is not proposed to construct a below ground piped drainage system to convey this run off.

Run off from the Central Hub Building, where possible, will discharged to ground via infiltration. If this is not feasible the discharge will be attenuated to greenfield run off rates and discharged into the adjacent storage pond.

For the main overflow car parking area of approximately 110 spaces it is proposed to discharge run off into the ground via a permeable paving system. If this is not feasible the run off will be attenuated to greenfield run off rates and discharged into the adjacent storage pond.

Some existing buildings are to be retained. A drainage survey will be carried out on the existing system and an assessment made by the engineer as to whether it can be reused. It is likely that a new drainage system will need to be constructed.

Principles for discharge from these buildings will be as for the Central Hub Building.

Where existing roads are currently positively drained it is proposed to continue for these to be positively drained. A drainage survey will be required to establish the connectivity and identify any issues or defect that need to be rectified.

Generally surface water run-off from proposed access roads will discharge onto adjacent landscaping via a filter trench running along the side of the road.

In heavily trafficked areas, such as around the Central Hub Building, positive drainage is proposed. This will either infiltrate or be attenuated to greenfield run off where infiltration is not possible.

The principles for drainage will extend to the phase 2 development. Surface water drainage off lodge roofs will discharge to ground and surface water run-off from proposed access roads will discharge onto adjacent landscaping via a filter trench running along the side of the road.

Where possible SuDs drainage systems and infiltration will be used to deal with the surface water run off to try and achieve a less engineered more natural drainage system. However, if infiltration is poor or not possible flows will be attenuated to near as practicable greenfield rates and discharged into the adjacent lakes.

The use of SuDs drainage techniques and systems will be incorporated into the surface water drainage design where practical and feasible to do so.

The use of SuDs infiltration systems will be subject to on site infiltration testing.

All new surface water drainage will be design in accordance with BS EN 752, the latest version of Sewers for Adoption and Building Regulations requirements as required.

Within the site overall pond and lake water levels are controlled by the use of weirs. Surface water from ponds L7 and L4 will overflow into a series of surface streams and ponds which will meander around the development area and discharge into Q3 lake.
Q3 lake outfalls into Stream A. Water level in Q3 lake will be maintained by a weir.

J Millar
For and on behalf of JPG (Leeds) Limited

September 2019

Appendix A Drainage Strategy Plan

DO NOT SCALE

NOTES

GENERAL NOTES

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17. SUITABLY SIZED PETROL INTERCEPTORS MUST COMPLY WITH THE REQUIREMENTS OUTLINE IN PPG3 THESE INCLUDE SILT STORAGE CAPACITY AND HIGH LEVEL HYDROCARBON ALARM WIRED BACK TO A MANNED OFFICE.
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20. THE CONTRACTOR SHALL SUITABLY PROTECT PEDESTRIANS AND VEHICLES FROM WORKING AREAS.
21. ALL PIPES SHALL BE LAID WITH LEVEL SOFFITS AND ALL MANHOLE/INSPECTION CHAMBER INVERT LEVELS SHOWN ARE FOR THE OUT GOING PIPE (UNLESS OTHERWISE INDICATED IN THE DRAWING), PIPE RUNS SHALL BE LAID TO THE INVERT LEVELS AS DETAILED ON THE CONTRACT DRAWINGS. (NOTE THAT ALL PIPE GRADIENTS INDICATED ON THE DRAWINGS ARE APPROXIMATE).
22. ALL RAINWATER PIPES AND INTERNAL FOUL DRAIN CONNECTIONS POINTS ARE TO BE SIZED & POSITIONED AS SHOWN ON THE ARCHITECTS DRAWINGS. THE CONTRACTOR SHALL SUPPLY SUITABLE ADAPTORS AT PROPOSED GROUND LEVELS OR FINISHED FLOOR LEVEL TO ALLOW CONNECTION OF THE ABOVE GROUND DRAINAGE SYSTEM.(DETAILS OF THE ABOVE GROUND DRAINAGE SYSTEM AND ADAPTORS ALL BY OTHERS).
23. UPON COMPLETION OF THE DRAINAGE WORKS THE CONTRACTOR SHALL CLEAN ALL DRAIN RUNS BY JETTING AND REMOVE ALL DEBRIS FROM SITE. NO DEBRIS SHALL BE PERMITTED TO ENTER THE PUBLIC SEWER AND/OR WATERCOURSE SYSTEM. ONCE THE DRAINAGE SYSTEM HAS BEEN FULLY CLEANED OUT A CCTV CAMERA CONDITION SURVEY SHALL BE UNDERTAKEN TO ALL CONSTRUCTED DRAINAGE AND SEWER PIPES WITH THE FOOTAGE ISSUED TO THE ENGINEER FOR VIEW. THE AS BUILT INVERT AND COVER LEVELS SHALL BE RECORDED BY THE CONTRACTOR AND PASSED ON TO THE ENGINEER FOR REVIEW.

FWMH-37
FWMH-36
FWMH-07
FWMH-44A
FWMH-44
FWMH-89
FWMH-90
FWMH-91
FWMH-92
FWMH-93
FWMH-94
FWMH-45
FWMH-46
FWMH-47
FWMH-57
FWMH-58
FWMH-56
FWMH-48
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FWMH-76
FWMH-73
FWMH-63
FWMH-64
FWMH-65
FWMH-66
FWMH-67
FWMH-68
FWMH-71
FWMH-70
FWMH-69

TOP OF CLIFF
BOTTOM OF CLIFF
Rock Shelf
TUNNEL
11Kv Cable Pot-Ended for Future Supply to Upper Lakes Sub-Station

FLOW SWITCH CHAMBER DETAILS FWMH-44A
DETAILS TBC.
IL168.655 (150Ø)
DISCHARGE FROM THE 3 PUMPING STATIONS
8.530l/s DESIGN FLOW (6xDWF+10%).
DWF = 1.280l/s

FOUL WATER FLOW FROM UNITS
NUMBER OF UNIT CONNECTED = 64 (ASSUME 4 PEOPLE/UNIT)
ASSUMED 450L/DAY/PERSON (TBC. BY CLIENT) = 115200 L/DAY
DESIGN FLOW OF 8.800l/s (6DWF+10%)
DWF = 1.335l/s

FOUL WATER FLOW FROM HUB
NUMBER OF UNIT CONNECTED = 58 (ASSUME 4 PEOPLE/UNIT)
ASSUMED 450L/DAY/PERSON (TBC. BY CLIENT) = 104400 L/DAY
DESIGN FLOW OF 14.180l/s (6DWF+10%)
DWF = 2.150l/s

FOUL WATER FLOW FROM UNITS
NUMBER OF UNIT CONNECTED = 58 (ASSUME 4 PEOPLE/UNIT)
ASSUMED 450L/DAY/PERSON (TBC. BY CLIENT) = 104400 L/DAY
DESIGN FLOW OF 7.975l/s (6DWF+10%)
DWF = 1.210l/s

FOUL WATER PACKAGED TREATMENT PLANT SIZED TO SUIT DEVELOPMENT DESIGNED BY SPECIALIST
OUTLET TO BE PUMPED TO DITCH
PACKAGED TREATMENT PLANT TO BE DESIGN IN ACCORDANCE WITH THE LATEST EA STANDARDS AND DISCHARGE CRITERIA
ALLOW FOR VEHICULAR ACCESS TO TREATMENT PLANT AND PUMPING STATION FOR MAINTENANCE
TREATMENT PLANT TO BE LOCATED IN A SECURE COMPOUND & SHALL BE SCREENED FROM THE GENERAL PUBLIC AS REQUIRED

TREATED FW EFFLUENT OUTFALL INTO POND VIA PCC HEADWALL

FW CONNECTION TO PICK UP THE EXISTING BUILDINGS THAT ARE TO BE RETAINED & RE-USED

LEGEND:

- PROPOSED SITE BOUNDARY
- EXISTING FW DRAINS /SEWERS
- EXISTING SW DRAINS/SEWERS
- PROPOSED FW DRAINS/SEWERS
- PROPOSED SW DRAINS/SEWERS
- PROPOSED FW RISING MAIN
- PROPOSED SW RISING MAIN
- EXISTING COMBINED DRAINS/SEWERS
- PROPOSED COMBINED DRAINS/SEWERS
- EXISTING FW MANHOLE
- EXISTING SW MANHOLE
- PROPOSED FW MANHOLE
- PROPOSED SW MANHOLE
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- RWP — PROPOSED RAINWATER DOWN PIPE SIZE & LOCATION TBC BY OTHERS
- RG — PROPOSED TRADITIONAL TYPE ROAD GULLY WITH 150Ø OUTLET PIPE
- RE — PROPOSED RODDING EYE
- PROPOSED DRAINAGE CHANNEL
- PROPOSED KERB DRAINAGE

SEWER AND DRAIN TESTING NOTES

1. ALL SEWERS AND DRAINS CONSTRUCTED AS PART OF THE CONTRACT SHALL BE TESTED AFTER THEY ARE JOINTED AND BEFORE ANY CONCRETE OR BACKFILLING IS COMMENCED, OTHER THAN SUCH AS MAY BE NECESSARY FOR STRUCTURAL STABILITY WHILST UNDER TEST.
2. TESTING SHALL BE IN ACCORDANCE WITH SFA AND BS EN 1610.
3. TESTING OF PIPES UP TO AND INCLUDING 750mm NOMINAL DIAMETER SHALL BE BY MEANS OF AN AIR OR WATER TEST. FOR PIPES LARGER THAN 750mm NOMINAL DIAMETER A VISUAL EXAMINATION SHALL BE CARRIED OUT.
4. A FURTHER TEST SHALL BE CARRIED OUT AFTER THE BACKFILLING IS COMPLETE.
5. ADDITIONAL TESTING MAYBE REQUIRED AS INSTRUCTED BY THE WATER COMPANY AND/OR HIGHWAYS INSPECTOR/REPRESENTATIVE.
6. AIR TESTS SHALL BE CARRIED OUT IN ACCORDANCE WITH SFA SECTION 5.7.4 AND BS EN 1610.
7. WATER TESTS SHALL BE CARRIED OUT IN ACCORDANCE WITH SFA SECTION 5.7.5 AND BS EN 1610.
8. VISUAL INSPECTIONS (CCTV SURVEY) SHALL BE CARRIED OUT BY A QUALIFIED AND APPROVED CONTRACTOR, AND IN ACCORDANCE WITH THE "WSA/FWR MODEL CONTRACT DOCUMENT FOR SEWER CONDITION INSPECTIONS".
9. THE FOUL WATER RISING MAIN SHALL BE PRESSURE TESTED BY THE M&E CONTRACTOR AND CERTIFICATION PROVIDED TO THE WATER COMPANY A REPRESENTATIVE FROM THE WATER COMPANY MAY NEED TO BE PRESENT DURING THE TESTING THE CONTRACTOR SHALL LIAISE WITH THE WATER COMPANY INSPECTOR AS TO THERE REQUIREMENTS.

REV	DESCRIPTION	DATE	BY
P01	DESIGN GENERALLY UPDATED & PUMPING STATION DETAILS ADDED	24.09.2019	JDM

Project
MONEYSTONE LEISURE PARK

Drawing Title
PROPOSED DRAINAGE LAYOUT
1 OF 2

WORK IN PROGRESS

Architect
NBDA ARCHITECTS

JPG
www.jpg.group
Leeds London Birmingham 0113 263 1155

JPG Project Ref	Scale at A0	Date	Checked	Drawn
5457	1:500	MAR 2019		JH

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19. THE CONTRACTOR SHALL ALLOW FOR OBTAINING ALL APPROVALS FROM THE RELEVANT AUTHORITIES WHEN WORKING IN THE PUBLIC HIGHWAY AND ON THE SEWERAGE SYSTEM.
20. THE CONTRACTOR SHALL SUITABLY PROTECT PEDESTRIANS AND VEHICLES FROM WORKING AREAS.
21. ALL PIPES SHALL BE LAID WITH LEVEL SOFFITS AND ALL MANHOLE/INSPECTION CHAMBER INVERT LEVELS SHOWN ARE FOR THE OUT GOING PIPE (UNLESS OTHERWISE INDICATED IN THE DRAWING), PIPE RUNS SHALL BE LAID TO THE INVERT LEVELS AS DETAILED ON THE CONTRACT DRAWINGS, (NOTE THAT ALL PIPE GRADIENTS INDICATED ON THE DRAWINGS ARE APPROXIMATE).
22. ALL RAINWATER PIPES AND INTERNAL FOUL DRAIN CONNECTIONS POINTS ARE TO BE SIZED & POSITIONED AS SHOWN ON THE ARCHITECTS DRAWINGS. THE CONTRACTOR SHALL SUPPLY SUITABLE ADAPTORS AT PROPOSED GROUND LEVELS OR FINISHED FLOOR LEVEL TO ALLOW CONNECTION OF THE ABOVE GROUND DRAINAGE SYSTEM.(DETAILS OF THE ABOVE GROUND DRAINAGE SYSTEM AND ADAPTORS ALL BY OTHERS).
23. UPON COMPLETION OF THE DRAINAGE WORKS THE CONTRACTOR SHALL CLEAN ALL DRAIN RUNS BY JETTING AND REMOVE ALL DEBRIS FROM SITE. NO DEBRIS SHALL BE PERMITTED TO ENTER THE PUBLIC SEWER AND/OR WATERCOURSE SYSTEM. ONCE THE DRAINAGE SYSTEM HAS BEEN FULLY CLEANED OUT A CCTV CAMERA CONDITION SURVEY SHALL BE UNDERTAKEN TO ALL CONSTRUCTED DRAINAGE AND SEWER PIPES WITH THE FOOTAGE ISSUED TO THE ENGINEER FOR VIEW. THE AS BUILT INVERT AND COVER LEVELS SHALL BE RECORDED BY THE CONTRACTOR AND PASSED ON TO THE ENGINEER FOR REVIEW.

FWMH-18 — 17.8m FWS 150Ø @ 1:219
FWMH-17 — 34.5m FWS 150Ø @ 1:100
FWMH-19 — 32.2m FWS 150Ø @ 1:100
FWMH-16 — 39.4m FWS 150Ø @ 1:90
FWMH-20 — 17.8m FWS 150Ø @ 1:100
FW PUMPING STATION No.3
FWMH-23 — 23.9m FWS 150Ø @ 1:20
FWMH-22 — 32.2m FWS 150Ø @ 1:81
FWMH-21 — 48.0m FWS 150Ø @ 1:80
FWMH-25 — 42.0m FWS 150Ø @ 1:100
FWMH-28
FWMH-29
FWMH-26 — 42.0m FWS 150Ø @ 1:100
FWMH-30
FWMH-27 — 42.0m FWS 150Ø @ 1:100
FWMH-31 — 34.6m FWS 150Ø @ 1:19
FWMH-33 — 11.8m FWS 150Ø @ 1:2
FWMH-34 — 10.5m FWS 150Ø @ 1:2
FWMH-32 — 15.6m FWS 150Ø @ 1:40
FWMH-35 — 9.5m FWS 150Ø @ 1:150
FW PUMPING STATION No.2
FWMH-38 — 7.7m FWS 150Ø @ 1:14
FWMH-37 — 14.0m FWS 150Ø @ 1:150
FW RISING MAIN SIZE TBC. BY PUMPING STATION MANUFACTURER/SUPPLIER LENGTH 526.0m AVERAGE DEPTH TO SOFFIT 1.20m. GRADIENT OF RISING MAIN TO BE MINIMUM 1:500 RISING AND 1:300 FALLING
ASSUME ALL FOUL WATER PIPEWORK TO BE 150Ø UNO. ON THE DRAWING LAID AT A MINIMUM GRADIENT OF 1:150 THIS ASSUMES THAT AT LEAST 5 TOILETS ARE CONNECTED
FW RISING MAIN SIZE TBC. BY PUMPING STATION MANUFACTURER/SUPPLIER LENGTH 206.0m AVERAGE DEPTH TO SOFFIT 1.20m. GRADIENT OF RISING MAIN TO BE MINIMUM 1:500 RISING AND 1:300 FALLING
FLOW SWITCH CHAMBER DETAILS FWMH-44A
15.3m FWS 150Ø @ 1:100 — FWMH-14
FW PUMPING STATION No.1
32.1m FWS 150Ø @ 1:100 — FWMH-13
FW RISING MAIN SIZE TBC. BY PUMPING STATION MANUFACTURER/SUPPLIER LENGTH 407.0m AVERAGE DEPTH TO SOFFIT 1.20m. GRADIENT OF RISING MAIN TO BE MINIMUM 1:500 RISING AND 1:300 FALLING
46.4m FWS 150Ø @ 1:100 — FWMH-12
22.8m FWS 150Ø @ 1:10 — FWMH-06
19.2m FWS 150Ø @ 1:10 — FWMH-05
40.5m FWS 150Ø @ 1:150 — FWMH-11
20.4m FWS 150Ø @ 1:9 — FWMH-03
FWMH-04 — 9.0m FWS 150Ø @ 1:12
+172
26.7m FWS 150Ø @ 1:80 — FWMH-02
27.2m FWS 150Ø @ 1:29 — FWMH-01
41.7m FWS 150Ø @ 1:26
FWMH-10 — 44.2m FWS 150Ø @ 1:16
FWMH-09 — 42.0m FWS 150Ø @ 1:16
FWMH-36 — 79.9m FWS 150Ø @ 1:100
FWMH-08 — 38.8m FWS 150Ø @ 1:28
FWMH-40 — 44.4m FWS 150Ø @ 1:28
FWMH-41 — 50.8m FWS 150Ø @ 1:16

PUMPING STATION No.1

TO COMPLY WITH BUILDING REGULATIONS DOCUMENT H 24 HOURS EMERGENCY STORAGE SHALL BE PROVIDED FOR PRIVATE FW PUMPING STATIONS
NUMBER OF UNIT CONNECTED = 15 (ASSUME 4 PEOPLE/UNIT)
ASSUMED 450L/DAY/PERSON (TBC. BY CLIENT) = 27000 L/DAY
DESIGN FLOW OF 2.065l/s (6DWF+10%)
STORAGE REQUIRED 27.0m3 PER 24 HOURS OF OPERATION
PUMPING RATE 3xDWF = 0.950l/s
CL155.800
IL152.225 (150Ø)
SUMP 151.725m
Dp. 3.575m
PACKAGE PUMPING STATION TO BE DESIGN TO ACCOMMODATE THE EMERGENCY STORAGE IN A COMBINED PUMPING STATION/ TANK

PUMPING STATION No.2

TO COMPLY WITH BUILDING REGULATIONS DOCUMENT H 24 HOURS EMERGENCY STORAGE SHALL BE PROVIDED FOR PRIVATE FW PUMPING STATIONS
NUMBER OF UNIT CONNECTED = 27 (ASSUME 4 PEOPLE/UNIT)
ASSUMED 450L/DAY/PERSON (TBC. BY CLIENT) = 48600 L/DAY
DESIGN FLOW OF 3.715l/s (6DWF+10%)
STORAGE REQUIRED 49.0m3 PER 24 HOURS OF OPERATION
PUMPING RATE 3xDWF = 1.700l/s
CL156.250
IL152.625 (150Ø)
SUMP 152.125m
Dp. 4.125m
PACKAGE PUMPING STATION TO BE DESIGN TO ACCOMMODATE THE EMERGENCY STORAGE IN A COMBINED PUMPING STATION/ TANK

PUMPING STATION No.3

TO COMPLY WITH BUILDING REGULATIONS DOCUMENT H 24 HOURS EMERGENCY STORAGE SHALL BE PROVIDED FOR PRIVATE FW PUMPING STATIONS
NUMBER OF UNIT CONNECTED = 20 (ASSUME 4 PEOPLE/UNIT)
ASSUMED 450L/DAY/PERSON (TBC. BY CLIENT) = 36000 L/DAY
DESIGN FLOW OF 2.750l/s (6DWF+10%)
STORAGE REQUIRED 36.0m3 PER 24 HOURS OF OPERATION
PUMPING RATE 3xDWF = 1.250l/s
CL155.000
IL151.375 (150Ø)
SUMP 150.875m
Dp. 4.125m
PACKAGE PUMPING STATION TO BE DESIGN TO ACCOMMODATE THE EMERGENCY STORAGE IN A COMBINED PUMPING STATION/ TANK

REV	DESCRIPTION	DATE	BY
P01	DESIGN GENERALLY UPDATED & PUMPING STATION DETAILS ADDED	24.09.2019	JDM

Project
MONEYSTONE LEISURE PARK

Drawing Title
PROPOSED DRAINAGE LAYOUT
2 OF 2

WORK IN PROGRESS

Architect
NBDA ARCHITECTS

JPG
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JPG Project Ref	Scale at A0	Date	Checked	Drawn
5457	1:500	MAR 2019		JH

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